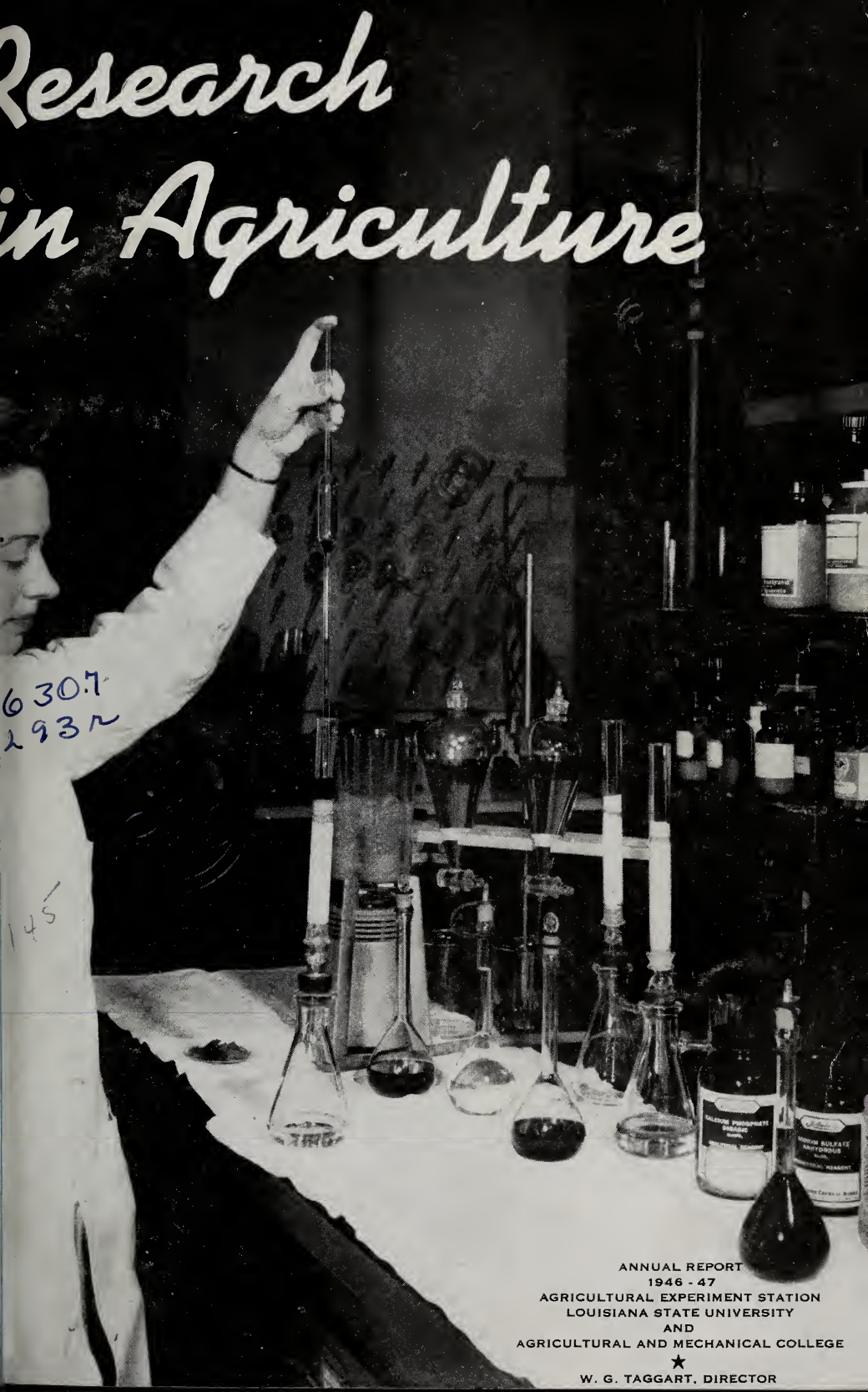
1948

Research in agriculture 1946-1947: annual report.

W R. Odson

Research in Agriculture



ANNUAL REPORT
1946 - 47
AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE
★
W. G. TAGGART, DIRECTOR

Research in Agriculture

1946-47

●

ANNUAL REPORT

●

AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE, LOUISIANA
W. G. TAGGART, *Director*

●

Compiled by I. L. Forbes from Reports of Heads of
Departments and Project Leaders
Year Ending June 30, 1947

Table of Contents

COVER—Why are some crop varieties or farm products better than others? Sometimes it's because they have more food value. Here a staff member of the Department of Agricultural Chemistry and Biochemistry is determining the carotene, or provitamin A, content of pasture grasses in one of the Experiment Station laboratories devoted to development of better agricultural products. Similar studies are being conducted on the carotene content of milk, sweet potatoes, and other farm products.

Letter of Transmittal

Baton Rouge, Louisiana
March 15, 1948

Governor James Houston Davis
Baton Rouge, Louisiana

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1946, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. Taggart, *Director*
Louisiana Agricultural Experiment Station

Agricultural Chemistry and Biochemistry

The Problem of Supplying Milk for the School Lunch Program

Many rural school lunch programs have been unable to provide an adequate supply of sanitary fresh milk.

In order to study the acceptability of evaporated milk for beverage use in such situations, evaporated milk was supplied to seven consolidated schools in different areas of Louisiana. Sufficient evaporated milk was provided to serve each child a half pint of reconstituted milk each day for four weeks. An average of 1578 children were served the reconstituted milk each day. Any brand of evaporated whole milk available in local wholesale groceries was used. The evaporated milk was mixed with an equal volume of water and served without the addition of any flavoring. Care was taken, however, to see that the reconstituted milk was cold when served and was protected from foreign flavors.

Acceptance of the reconstituted milk was, on the whole, very good. In most schools a larger percentage of the younger children than of the older drank at least one glass of milk. In schools where the principals and teachers showed by example and precept their interest in having the children drink the milk, acceptance was exellent.

The average daily attendance in each school lunch room and the average number of children who drank a full glass of the reconstituted milk each day were calculated. From these calculations it was found that from 59 to 97 per cent of the children, in the first, second and third grades; from 53 to 96 per cent of those in the fourth, fifth and sixth grades, and from 33 to 89 per cent of those in the junior and senior high school group drank a full glass of the reconstituted milk each day.

From the above data it is evident that reconstituted evaporated milk can readily be introduced in the school lunch program. Careful attention to the psychological influences involved will facilitate the acceptance of evaporated milk as well as other unfamiliar foods.

This study was supported by a grant from the Evaporated Milk Association.—Martha E. Hollinger and Cornelia P. Staples.

Further Studies on the Lipide Stimulation of *Lactobacillus Casei*

Lipide stimulation of *Lactobacillus casei* in biotin-free media has been difficult to interpet because of uncertainties as to the influence of unremovable traces of biotin. Three attempts have been made to secure

truly biotin-free media: (1) by replacing casein hydrolysate with mixtures of pure amino acids; (2) by replacing casein hydrolysate with peroxide-treated amino acids, purines, and pyrimidines; and (3) by adding avidin in the form of crude egg white to the casein hydolysate medium. With all three of these modifications, oleic acid still proved stimulatory to the growth of *Lactobacillus casei*, and no growth was possible in the absence of oleic acid unless biotin or some other lipide was supplied.

A number of surface active agents were examined for their stimulatory effect on *L. casei*. In general, non-ionic detergents proved stimulatory, the most stimulatory ones being oleates. With certain of these oleates, growth of the bacteria was more rapid than in the control cultures containing biotin. With oleic and linoleic acids lag periods of 48 hours and 7 days, respectively, must elapse before growth of the culture can be detected in the absence of biotin. If, however, sterile biotin-free bovine serum albumin is added to the cultures, oleic and linoleic acids will support a growth more rapid than occurs in the control cultures containing biotin.—Virginia R. Williams and E. A. Fieger.

Further Studies of the Toxic Principles of the Tung Nut

Analyses of the blood of tung-poisoned chicks for hemoglobin erythrocytes, cell fragility, glucose, chloride, serum calcium, cholesterol, uric acid, creatinine, urea, NPN, serum albumin, and serum globulin failed to reveal any marked shifts from normal values.

A highly concentrated preparation of the thermostable toxic factor was prepared from the crude ethanol extract by extracting with benzene and repeatedly chromatographing the benzene extract on columns of magnesium oxide: Celite (1:1). The final preparation was a heavy oil which failed to crystalize in spite of varied attempts to induce crystallization. Nitrogen, sulfur and halogen could not be detected in the preparation. Rapid absorption of bromine indicated unsaturation. An ethanol solution of the final preparation showed absorption maxima at 230 and 269 millimicrons, indicating the presence of conjugated double bonds.—James A. Watson, Jr., and Jordan G. Lee.

Experimental Lathyrism

Rations containing a high percentage of ground Singletary peas produce a characteristic paralysis (lathyrism) in laboratory animals. Neither type nor quantity of fat seems to have any effect upon time of onset or severity of the paralysis. Thousandfold concentration of the causative factor has been achieved by use of classical lead salt plus chloroform partition methods. The toxic principle is, therefore, associated with the basic nitrogen fraction, and a pure, crystalline picrate has been prepared from the concentrate. The physiological activity of this picrate has not, however, been tested.—Jordan G. Lee.

Shrimp Studies[1]

Frozen Raw Shrimp

Shrimp from each day's catch during two trips aboard the trawler "Ethel H" were examined organoleptically after nine and seven months' storage. Those from the second trip had been stored in No-Bac ice during the time they were on the trawler. After cooking, all samples were judged fair to excellent in appearance. Those from the top layer of the trawler's storage bins were rated higher in appearance than those from the bottom layer, which may have been due to the effect of less crushing rather than age. All samples had good flavor and odor. Differences between samples stored in ice nine days and those stored only two days before freezing were negligible.—E. A. Fieger and Harvye Lewis.

Frozen Boiled Shrimp

Experiments over a period of two years have shown that cooked shrimp can be kept by means of frozen storage, providing certain precautions are observed. Proportions used in cooking were approximately one quart of water for each pound of shrimp. Peeled shrimp boiled five to ten minutes in a solution containing five per cent of their weight in salt were acceptable after a frozen storage period of three months. Unpeeled shrimp boiled ten to twenty minutes in a solution containing ten per cent of their weight in salt were acceptable after a frozen storage period of six months. Six weeks was the maximum storage period for shrimp cocktail and shrimp creole. Moisture-vapor-proof containers were essential for the maintenance of high quality in this food.

Longer periods of storage for all these products resulted in lowered quality, particularly dryness, increased toughness and the development of rancidity.—E. A. Fieger and Harvye Lewis.

Bacteriological Studies

Bacterial counts were recorded on frozen shrimp of known pre-freezing history and on frozen shrimp from various commercial freezing plants after varying periods of storage at -17.8° C. (0° F.).

After 12 months' frozen storage, shrimp which were frozen on board a trawler immediately after catching, heading, and washing, contained 22,000 bacteria per gram. Headless shrimp which were held for nine days in iced storage contained more than a million bacteria per gram. Samples of headless shrimp which were packed in the top layer of the icing bin and samples which were headed and frozen after four days' iced storage as whole shrimp in the bottom of the bin gave much lower counts during frozen storage than commercially frozen or laboratory frozen samples of older pre-freezing ages. The lowest counts were found

[1] These investigations on shrimp were financed in part by a grant from the Refrigeration Research Foundation.

on shrimp which had been refrigerated without direct contact with ice before freezing.

An average reduction of 50 per cent in bacterial counts was recorded on market shrimp after one day's frozen storage; this was increased to 82 per cent reduction by two months' storage. Percentage reductions produced by two to twelve months' frozen storage of laboratory and commercially frozen products ranged from 48 to 99.2 per cent.

Bacterial counts on commercially frozen and stored shrimp varied widely and showed only a slight correlation with organoleptic examination.

Forty-nine per cent of 41 samples of freshly caught uniced shrimp contained members of the coli-aerogenes group of bacteria. With the exception of a single sample in which *E. Coli* only was found, all positive samples contained the genus *Aerobacter, A. cloacae* occurring more frequently than *A. Aerogenes.*

Of 105 samples of freshly caught and iced shrimp examined on board the fishing vessels, 45 per cent were positive for coliform bacteria; 35 per cent of all samples contained *Aerobacter* spp.; 4 per cent, *E. fruendii;* and 5 per cent, *E. coli.*

The coli-aerogenes group was found more frequently in or on the "heads" (cephalothorax) and in the slime than in the headless shrimp (tails).

All of 14 samples of market shrimp examined contained coliform bacteria; 57 per cent of them contained *E. coli. E. coli* was found in 62 per cent of these samples after two months' frozen storage, and at this time all samples were positive for the coli-aerogenes group.

Only 14 per cent of 62 laboratory frozen and stored samples of known prefreezing history contained coliform bacteria, and from none of these was *E. coli* isolated.

Since *E. coli* is rarely encountered in freshly caught shrimp the occurrence of this organism in appreciable numbers in market shrimp is indicative of the need for more rigid sanitation in the handling of this product.—Margaret Green.[2]

A New Method for Freezing Eggs in the Shell

A new method of freezing eggs without breaking the shells has been developed and is based upon treatments which change the relationship between bound water and free water content of the egg.

—S. Kaloyereas.

Use of Carbon Dioxide in Ripening of Meat

This experiment was conducted in collaboration with the Departments of Animal Industry and of Bacteriology. The use of carbon dioxide during ripening of meat proved beneficial by retarding the growth of bacteria and protecting it from rancidity changes during the subsequent freezing storage.—S. Kaloyereas.

[2] A staff member of the Department of Bacteriology, Louisiana State University, collaborating with the Department of Agricultural Chemistry and Biochemistry.

Quality Control of Foods

Last year a new method was developed in this laboratory for determining the drip of frozen foods; that is, the liquid which exudes from frozen foods during thawing. Further experiments show that the value of drip, as measured by the new method, can be used not only for the quality control of frozen foods but also for the products stored at temperatures above freezing. Changes of the constituents of drip such as total solids and ash content reflect in general changes occurring in the product itself during storage and therefore can be used as a reliable index for a quantitative determination of the quality of various products. This method can also be used to determine frost resistance of plants, as has been shown by experiments on sugar cane varieties.

—S. KALOYEREAS.

Preservation of Louisiana Fruits

Preservation of Fresh Peaches

Experiments were conducted using various percentages of carbon dioxide gas and dry ice in closed containers and insulated box cartons for the preservation of peaches. The results show that the use of dry ice not only for the shipment of fresh peaches to distant markets but also during the pre-shipping period in the packing shed appears quite promising. In order to avoid damage from freezing, the amount of dry ice used in individual packages should not exceed 3½ pounds for each 10 pounds of fruit. After being wrapped several times with paper, the dry ice should be put on top of the package. Small percentages of carbon dioxide gas also can be used profitably in gas tight containers, especially when the storage temperature is rather low (about 5° C.).

—S. KALOYEREAS AND D. C. ALDERMAN.[3]

Drying Figs

Drying Louisiana grown whole figs in the sun is very difficult under the prevailing climatic conditions, because of frequent showers in the summer and the quality of figs, which are small and lacking in sugar. Drying in a dehydrator or in the sun after treatment with sulfur dioxide is practical. The sulfuring treatment can be carried out by exposing the figs to the fumes of burning sulfur or more simply by dipping them for one to two minutes in a 3 per cent solution of sulfur dioxide. Such a solution can be prepared by allowing sulfur dioxide gas to pass into water until saturated and then diluting with an equal volume of water. Another simple process consists in dissolving two ounces of sodium sulfite and one ounce of hydrochloric acid (muriatic acid) in one quart of water. Halved figs can be dried in the sun, but the product is not as attractive as when the material is sulfured.

—S. KALOYEREAS.

[3] A staff member of the Department of Horticulture Research, Louisiana State University, collaborating with the Department of Agricultural Chemistry and Biochemistry.

Peach Varieties

Twenty-six varieties of peaches obtained from the North Louisiana Experiment Station were tested this past season for adaptability to freezing preservation. The peaches were immersed in boiling water for 45 seconds, peeled, sliced and packed with 60 per cent cane sugar syrup containing 0.2 per cent ascorbic acid in the proportion of three parts of fruit to one of syrup. After six months' frozen storage the peaches were given quality ratings by five judges.

The following table shows the rank and the approximate ripening period of each variety.

Variety (Listed in order of preference.)	*Ripening Period*
Fireglow	June 21—July 5
Raratin Rose	June 18—July 2
Sunhigh	June 23—July 7
Early Jubilee	June 21—July 5
J. H. Hale	July 1—July 14
Elberta	July 1—July 14
Redhaven	June 18—July 2
Triogem	June 21—July 5
Goldeneast	June 30—July 13
Carman	June 6—June 20
Dixigem	June 16—June 30
Sullivan's Early Elberta	July 1—July 14
Early Elberta	June 29—July 12
Summercrest	July 1—July 14
Halehaven	June 23—July 7
Golden Jubilee	June 21—July 5
Colora	June 23—July 7
Early Elberta (Gleason)	July 11—July 25
Early Halehaven (Early Haven)	June 16—June 30
Golden Globe	June 21—July 5
Early Red Free	June 5—June 19
Belle of Georgia	July 3—July 17
July Elberta (Burbank Elberta)	June 29—July 12
Early Halehaven (Early Haven)	June 23—July 7
F. V. 5-70	June 5—June 19
Hiley Belle	June 23—July 7

—E. A. Fieger, Harvye Lewis, and Rita Belle Attaya.

Strawberry Freezing

Cane Sugar Versus Corn Sugar

Strawberries of the Klonmore variety were prepared for freezing with cane sugar, corn sugar syrup and combinations of these. In all cases the ratio of sugar to fruit was one to four by weight. The samples were frozen and stored at 0° F. for six months and then tested organoleptically.

In general, sliced berries had better flavor and color than berries packed whole. Dry cane sugar and cane sugar syrup resulted in the best samples. Those packed with corn sugar syrup or with mixtures of

corn sugar syrup-cane sugar or syrup were much poorer in quality. Ascorbic acid and ascorbic acid-citric acid mixture when added to the fruit caused the product to become too acid. The use of dry corn sugar or syrups made of corn sugar instead of cane sugar in the preparation of strawberries for freezing is not recommended.

—E. A. Fieger, Harvye Lewis, and Rita Belle Attaya.

Varieties

Strawberries of 24 varieties and seedlings were organoleptically tested after having been frozen and stored for six months. The results of these tests on berries grown at the main station placed the varieties in the following order of preference: Konvoy, Marion Bell, Klondyke, and Klonmore. None of the seedlings were better than Konvoy or Marion Bell. Strawberries obtained from the Fruit and Truck Experiment Station, Hammond, ranked in the following order: Marion Bell, Konvoy, Klonmore, and Klondyke.

—E. A. Fieger, Harvye Lewis, and Rita Belle Attaya.

Agricultural Economics

Economic Studies of the Sugar Cane Industry

1. Large Sugar Cane Farms

Financial results of the operation of large sugar cane farms in Louisiana for the nine-year period 1937-45 indicate an average cost of $97 per acre, or $5.10 per ton, of sugar cane for the entire period. Unit costs averaged about $90 per acre in the 1937-39 pre-war period but increased to more than $130 per acre in 1945. These producers received an average gross income of $100 per acre, or $5.28 per ton, and the resulting net income amounted to about $3,000 per farm per year, $3.00 per acre, or $0.18 per ton of cane sold.

An analysis of the financial results for each year of the period indicated that in any given year and under the same climatic conditions and the same price structure, there were still variations from farm to farm in costs, returns, and net profits. The major factors found to be important in influencing net returns were the size of the farm, the yield of cane per acre, the relative efficiency in the use of man labor, and the proportion of the cropland planted to cane. The moderately large farms of this group (500 to 1,000 acres in sugar cane) made greater net returns per unit than the larger or the smaller farms of this type in six of the nine years studied. Although yields per acre varied from year to year, the farms on which average yields were from 5 to 10 per cent above the state average had lower costs and higher returns. On farms where direct labor costs per unit were held at a minimum by the use of machinery, total costs were reduced and net incomes increased in comparison with farms which had not mechanized. Also, the greater the specialization on the sugar cane enterprise, the higher were the returns from the entire farm business.

—J. Norman Efferson and Felix E. Stanley.

2. Family-type Sugar Cane Farms

The net cost of producing a ton of sugar cane on family-type farms in Louisiana varied from $3.78 in 1938 to $5.73 in 1945. Adding to these figures the value of the farmer's own labor to obtain a net cost equivalent to the cost of a business concern, the result was an average cost per ton varying from $4.29 in 1938 to $7.02 in 1945. The farmers surveyed lost from 3 to 24 cents per hour worked in 1938 and 1940 and made cash returns of from 20 to 38 cents per hour from 1942 to 1945. In addition, their non-cash farm privileges amounted to from 12 to 30 cents per hour worked. Their total returns, including both cash and non-cash items, varied from about 10 cents per hour in the 1938-40 pre-war period to about 50 cents per hour during the 1942-45 period.

The more efficient farms in most of the years studied were those with about 100 acres in all crops of which approximately 50 acres were in sugar cane, those which had average yields of 10 per cent or more above the state average and had at least a 20-ton per acre average for the nine-year period, and those on which all available man labor was utilized to the extent of more than 300 days per year.

On the larger of the family-type farms, averaging from 50 to 150 acres in sugar cane, the more the specialization in sugar cane and the less time spent working with other enterprises, the greater were the total net returns. On the smaller family-type farms, however, with from 2 to 30 acres in sugar cane, the more profitable producers were those who diversified their farm business by the addition of other cash crop enterprises and livestock enterprises.—J. Norman Efferson.

3. Raw Sugar Mills

Financial results of the operation of raw sugar mills in Louisiana for the nine-year period 1937-45 indicate an average cost of $3.76 per hundred pounds of raw sugar and a net cost, after deducting miscellaneous credits from total costs, of $3.14 per unit. These processors received an average price of $3.28 per hundred pounds for all raw sugar produced during the period. The resulting net income amounted to $17,000 per mill per year, $0.23 per ton of cane ground, or $0.14 per hundred pounds of raw sugar manufactured. In view of the fact that the average capital investment amounted to about $400,000 per mill, these nine-year returns are relatively low in comparison to earnings on capital invested for many other types of manufacturing industries during the same period of time.

From the point of view of raw sugar processors in Louisiana, the nine-year period 1937-45 can be characterized as a period of three favorable years, three average years, and three very unfavorable years. The three favorable years were 1941, 1942, and 1943, in which costs in relation to prices were favorable and weather conditions permitted normal operations. The three average years were 1938, 1939, and 1945. The three unfavorable years were 1937, 1940, and 1944. Each of these seasons was characterized by relatively small crops and low recovery rates.

The more efficient mills in each of the nine years studied were those which ground an average annual tonnage of more than 75,000 tons and those which obtained a relatively high rate of recovery per ton of cane ground.—J. Norman Efferson and Mildred Cobb.

The Competitive Position of the Sweet Potato Enterprise In the Macon Ridge Area

The recent expansion of sweet potato production along the Macon Ridge is the result primarily of urgent wartime demands for food and the inadequacy of existing cash crop alternatives.

In order to provide factual information upon which to make enterprise comparisons in this new area the Louisiana Agricultural Experiment Station conducted a sweet potato enterprise analysis in relation to the general farm business of 74 farms in West Carroll Parish in the spring of 1947. Cotton and sweet potatoes are the main cash crops that are grown along the Macon Ridge. Corn and lespedeza are the principal feed crops. These four crops are usually found in most cropping systems and considerable uniformity exists from farm to farm throughout the area.

Labor and power requirements for the production of these four crops are presented in Table 1.

The average cost of producing an acre of sweet potatoes was $83.23 in 1946, as compared with $44.03 for cotton, $17.43 for corn, and $13.78 for lespedeza. Labor was the most important single item of expense in the production of both sweet potatoes and cotton. Power and equipment costs were the most important cost items in the production of feed crops. The cost of seed and plants is a considerable item of expense in the production of sweet potatoes, amounting to $20.56, nearly one-fourth of the total expenses enumerated. The cost of land and management was not included in the enumerated production expenses because of the difficulty of obtaining a uniform pattern of objective valuations.

The gross value of an acre of sweet potatoes was $238.92 in 1946 and the average yield was 185.9 bushels. Of these 185.9 bushels 157.1 bushels were sold on the market at $210.97, and the remainder was used for home use, feed, and seed. The gross value of an acre of cotton in 1946 was $98.47, as compared with $35.08 for corn and $40.22 for lespedeza.

The net enterprise returns to land and management from sweet potatoes was nearly three times as great as the returns from cotton, $155.69 as compared to $54.44. The per acre returns to land and management were much less for corn and lespedeza.

In 1946 under the existing price and yield conditions the sweet potato enterprise was considerably more profitable than cotton. The relative return per hour of man labor was $1.47 as compared with $.89 for cotton. During the same period and in the same area the relative

TABLE 1. Labor and power required per acre to produce sweet potatoes, cotton, corn, and lespedeza, West Carroll Parish, 1946.

Crop[1]	Man Hours	Mule Hours	Tractor Hours	Truck Hours
Sweet potatoes	133.9	41.8	2.6	2.5
Cotton	93.1	29.7	2.7	.3
Corn	26.7	28.6	1.7	---
Lespedeza	17.0	13.3	1.5	.8

[1] Average yields per acre: sweet potatoes, 185.9 bushels; cotton, 249.4 pounds of lint; corn, 17.6 bushels, and lespedeza, 1.8 tons.

return per hour of man labor was $.97 for corn and $1.87 for lespedeza.

It should not be construed that, since the return to labor was greatest when employed in the production of lespedeza hay, this crop should supplant other crops in farming systems. Further qualification is also necessary before one should recommend a wholesale shift from cotton to sweet potatoes. It should be pointed out that 1946 was an unfavorable cotton year and a very good year for sweet potatoes. On the whole it is reasonable to conclude that the sweet potato enterprise provided an excellent cash crop alternative in the area in 1946 and if present price relationships continue the enterprise can be expanded profitably in most farming systems along the Macon Ridge.

—Frank D. Barlow, Jr., and C. B. Danielson.

Farm Storage of Sweet Potatoes

A large number of small sweet potato storage houses have been built by farmers in recent years as a result of lack of adequate storage space available to farmers, favorable farm returns from sweet potato production, and the profitableness of storing sweet potatoes for sale during the winter and spring months. Most of the farm storages have been built in the Opelousas-Sunset area.

A study of the practices, costs, and returns of 59 farm storages showed that about half were constructed during 1945 and 1946. Only 18 were built prior to 1942. The capacity ranged from 500 to 20,000 crates and averaged 3,545. Costs of construction averaged $467, but varied according to size and type of materials.

The 59 growers studied stored 72 per cent of their marketable crop in 1946, with average storings of 2,744 crates. Storage costs are dependent largely upon losses sustained in storage and the price of sweet potatoes lost. In 1946-47, storage costs amounted to 30 cents per crate sold, which included 3.2 cents per crate for storage operating costs, 1.7 cents overhead, and 25.1 cents for shrinkage and decay. Under the cost and price conditions of the 1935-39 period, a price increase of only 12 cents per crate sold would have been necessary to offset storage costs and losses. Over a period of years the seasonal increase in sweet potato prices averaged 25 per cent from November to March and 41 per cent from November to June. However, variations from year to year have been so great that average increases for several years cannot be used as a reliable guide in predicting the price movement for any particular season. In 1946-47, seasonal price increases were not sufficient to make storage profitable, and the storages studied lost an average of 22 cents per crate stored.

Storage involves extra care and labor in the winter months, risks of heavy losses from spoilage or price decline, and considerable financing. Growers who are willing and able to store sweet potatoes are likely to gain over a period of years, but must be able to stand heavy financial losses in some years.—M. E. Miller and M. D. Woodin.

Dehydration of Sweet Potatoes for Feed

Sixty dehydrating plants processed more than one million bushels of Louisiana sweet potatoes into about 17 million pounds of livestock feed during the 1946-47 season. This high-quality carbohydrate feed aided materially in reducing the deficit of feeds required in the state for its growing dairy and livestock industries.

A study of 32 plants showed an average investment of $8,936 per plant, and an average output of 239 tons of dehydrated material. Total cost of operation averaged $20.80 per ton. The most important factor affecting operating costs was the volume of sweet potatoes processed. Plants handling less than 200 tons of dry material had a cost of $40.40 per ton compared with $15.80 per ton for those processing more than 400 tons. Plants handling a large volume reduce the heavy overhead costs per ton, and utilize labor, fuel, and equipment more efficiently.

—M. D. Woodin and K. E. Ford.

Sweet Potato Prices

Long-time trends in sweet potato prices are important to commercial growers in making decisions where long-time investments, such as building a storage house, or major changes in the farm or business organization are contemplated. Since 1909 the farm price of all grades of sweet potatoes in Louisiana has ranged from a high of $1.80 per bushel in 1924 to a low of 42 cents in 1932, with a 38-year average price of 93 cents per bushel. Periods of high prices were during World Wars I and II and the middle 1920's. Sweet potato prices tend to follow the general movement of all farm commodity prices because sweet potato prices, like the prices of other products, are affected by changes in the level of consumer purchasing power. If anticipated farm commodity price declines materialize during the next few years, it is reasonable to expect lower sweet potato prices. While the purchasing power of consumers will largely determine the general level of sweet potato prices, the long-time market position of Louisiana sweet potatoes, and consequently their price, can be improved by the continued efforts of the industry to increase consumer demand for Louisiana sweet potatoes. To fully benefit from the promotion of Louisiana sweet potatoes, growers must provide consumers with the type and quality of product which they desire and are willing to pay for. An increased consumer demand will permit the marketing of more sweet potatoes at favorable prices. The relationship between size of crop and farm price has been such in the past that large sweet potato crops have been of greater total value to the industry than small crops.

Year-to-year changes in sweet potato prices are largely the result of changes in the size of the crop, after allowance has been made for general farm commodity price level conditions. The usual relationship between production and price of pre-World War II years has not

existed since 1942 because of abnormal economic conditions. The size of the Irish potato crop appears to have little direct effect on year-to-year changes in sweet potato prices.—M. E. Miller and M. D. Woodin.

Marketing Louisiana Sweet Potatoes in Pittsburgh

The 1947 sweet potato marketing study extended previous consumer preference studies to Pittsburgh. The new phases of the sweet potato study included the effect of size and price differentials on consumer demand, and the reactions of Pittsburgh dealers to Louisiana sweet potatoes.

Although Louisiana sweet potatoes were reported on the whole as arriving at Pittsburgh in good condition, dealers insisted that they should be more carefully graded and contain less waste and fewer off-sizes. Brands of sweet potatoes consistently good in quality from one shipment to another command a premium in price. Restaurants purchased mostly the lower grades from the fresh markets, but indicated the need for a good quality of canned sweet potatoes at more moderate prices.

The survey reveals (1) that better standardized products would more closely conform to the demands of modern retail merchandising; (2) that sweet potatoes should be graded and packed according to size; and (3) that better preparation of the product for market would greatly stimulate consumer demand.—J. M. Baker.

Trends in Sweet Potato Marketing

Significant changes have occurred in sweet potato marketing in Louisiana since the industry became of commercial importance. From total shipments of less than 500 carloads during the 1920's the industry now ships nearly 20 times as many sweet potatoes annually, and is the principal supplier of most of the large cities of the country. Shipments have doubled since the middle 1930's. The cities in the North Central States continue to be the best markets for Louisiana sweet potatoes, but New York and Philadelphia have recently moved up among the 10 leading markets. Chicago has replaced Detroit as the largest receiver from Louisiana.

One pronounced trend has been the increase in the number of shippers in the state. In the 4-year period 1933-36, there were an average of 50 rail shippers and 462 truck shippers, compared with a total of 1322 shippers in the 1945-46 season. The proportion of the volume of commercial shipments moving by rail and truck has remained practically the same during the past decade. In the 1935-36 season, 63 per cent of total crates shipped moved by rail, while in 1945-46, 64 per cent was by rail.

Another significant change in the disposition of the sweet potato crop is the greater proportion now used for canning and for dehydra-

tion for livestock feed. In recent years approximately one-fourth of the crop has been processed, compared with only negligible quantities 10 years ago.—M. D. Woodin.

Prices Received by Louisiana Farmers for Milk During 1946-47

The average wholesale price received by dairy farmers in Louisiana for four per cent milk which was consumed as fluid milk during the 13-month period from July, 1946, to July, 1947, was $5.62 per hundredweight. During the period the average price varied from $4.75 per hundredweight in July to $5.72 during October, $5.88 in December, 1946, and $5.89 in March, and $5.43 in June, 1947.

Farmers in the Monroe milkshed received an average of $6.01 per hundredweight of four per cent milk during the period, which was the highest price received by farmers in the state. The average prices received by farmers in the other important milksheds in the state were: $5.83 in Lafayette, $5.50 in Alexandria, $5.44 in New Orleans and $5.36 in Shreveport.

In general, the price received by farmers in Louisiana for milk for fluid consumption is equal to or greater than prices received by farmers in most areas of the United States for the same quality milk.

—William H. Alexander.

Milk Costs and Prices, Florida Parishes

Total costs of milk production in the Southeast Louisiana, or Florida Parishes, dairy area averaged $2.18 per hundred pounds in 1938 but increased each year throughout the following ten years to reach a high point of $6.71 per hundred pounds in 1947. The most important items causing this steadily upward trend in the costs of producing milk have been the continually advancing prices for concentrate and roughage dairy feeds and for hired labor.

Prices received for fluid milk by producers in the New Orleans area increased from about $2.30 per hundredweight in 1938 to $6.00 per unit in 1947. If all costs are considered, including the value of the farmer's time charged at the rate he would have had to pay for hired labor, a net loss is indicated for the most recent year, 1947. Since most of the farmers in the region do all of their own work on the farm, this net loss is an indication that these producers are not earning as much for their own labor as they have to pay for hired labor but is not an indication that they are losing money on a cash basis. In 1938, these producers earned about 20 cents per hour of labor on the dairy enterprise; in 1947, the equivalent earning amounted to about 45 cents per hour. Hired labor cost 50 cents per hour in 1947; thus, they lost 5 cents per hour on all hired labor but earned 45 cents per hour for their own labor.—J. Norman Efferson.

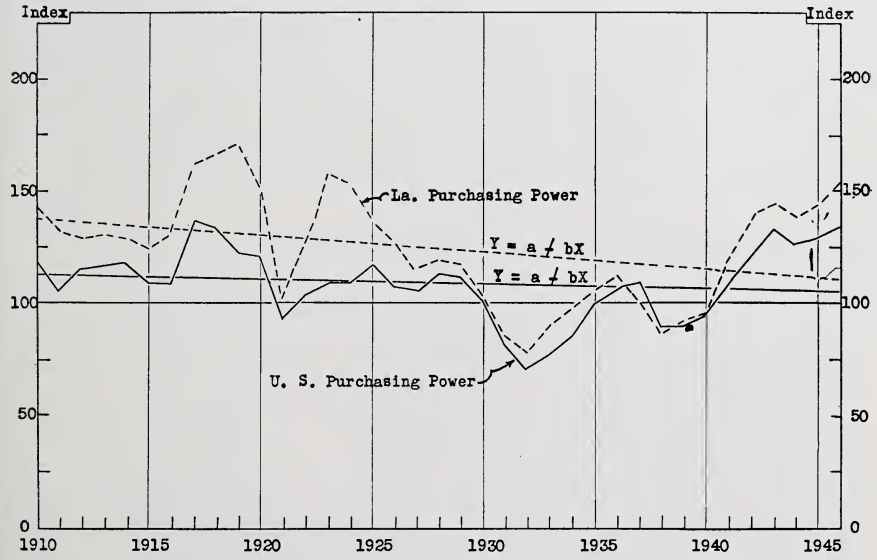
Prices and Statistics[1]

Prices received by Louisiana farmers for agricultural products continued their upward course during 1947. The composite index of prices received by farmers rose from 283 (August, 1934-July, 1939=100) in December, 1946, to 305 in December, 1947. The volume of production of agricultural commodities was larger in Louisiana in 1947 than in 1946. The increased production for which higher prices were received in 1947 returned an estimated $325,000,000 in cash income from farm marketings in Louisiana, as compared with approximately $251,000,000 in 1946.

The general level of prices paid by farmers continued its upward swing. This index had advanced to 209 (August, 1934-July, 1939=100) in December, 1947, as compared with 180 in December, 1946. The index of purchasing power of Louisiana farm products per composite unit declined from 157 in December, 1946, to 146 in December, 1947.

—J. P. Montgomery.

Indexes of Purchasing Power of Farm Products of the United States and of Louisiana, 1910-1946.
(August 1934-July 1939=100)



The purchasing power of Louisiana farm products was consistently higher than the average for the United States during the 37-year period from 1910 through 1946.

[1] Basic data are obtained through a cooperative agreement between the Louisiana Office of Agricultural Estimates, Bureau of Agricultural Economics, U. S. Department of Agriculture, and the Agricultural Experiment Station, Louisiana State University.

Farm Real Estate Values in Louisiana, 1947

The price per acre of farm real estate in Louisiana in July, 1947, was 86 per cent above the average price during the period 1935-39. For the United States as a whole, it was 95 per cent above the level of the pre-war years. Although the recent rise in farm real estate values in Louisiana is large, it is less than in other southern states, with the exception of Florida and Texas. The main forces associated with higher land prices are the depreciated value of the dollar, increased prices for farm products and higher annual rental returns.

The physical condition of the agricultural plant in Louisiana did not improve during the war; probably it deteriorated slightly. Because of the shortage of materials and the character of labor available during the war, few new buildings were constructed and the old ones are in need of repairs and improvements. The pressure for maximum production may have depleted soils in those areas where normal rotation practices were not followed.

During the land boom associated with World War I, the price paid for farms in Louisiana rose swiftly and reached a peak in 1920 which was 98 per cent above the pre-war period 1912-14. By 1922, land prices had dropped by 58 per cent. During the 8-year period between 1922 and 1930, the selling prices of farms remained relatively stable, and then declined until by 1933 they were below the level of 1914. From 1933 to 1941 land prices rose gradually, but since 1941, they have increased sharply, repeating their behavior during and immediately following World War I. It is important for both buyers and lenders in 1947 to understand how much land prices have risen and to understand the risks involved for those who borrow a large part of the purchase price.

—Bueford M. Gile.

Prepackaging North Louisiana Peaches

A study was conducted in a large food store in Baton Rouge during July, 1947, to determine consumer reaction to full-tree-ripened and green-ripe peaches prepackaged for retail use. The former were displayed in two different sizes of cellophane wrapped trays, one containing six peaches and one containing eight, and priced at 13 cents a pound. The green-ripes were exhibited in cellophane bags of six peaches to the bag, in pliofilm bags containing an average of about 17 peaches, and in the open bin, all quoted at 10 cents a pound. Of the purchases of 1310.4 pounds, the full-ripe peaches accounted for 1070.4 pounds, or 81.6 per cent, as contained in 264 of the 6-peach and 309 of the 8-peach cellophane wrapped trays. The green-ripe peaches comprised the remaining purchases of 240 pounds, or 18.4 per cent, which included 15 six-peach cellophane bags, 45 pliofilm bags, and 12 purchases from the open bin averaging 8.9 peaches each. Many customers were observed enlarging their purchases of the full-ripe peaches by

taking more than one tray. At the three cents difference in price, consumer preference was approximately four to one in favor of the better quality product.

Difference in weight between the green-ripe and the full-ripe peaches was significant. The former averaged 4.45 ounces, or .28 pound, and the latter 4.60 ounces, or .29 pound. From green-ripe to full-ripe the gain in weight per bushel would be 1.6 pounds, or a little more than the equivalent of 5.5 peaches. Therefore, a bushel of the green-ripes comprising 172.6 peaches weighing 48 pounds would net retail at the quoted price of 10 cents, $4.80. The same lot of peaches, when full-ripe, would have increased to 1.03 bushels, or 49.6 pounds, and at 13 cents would bring $6.45, or a gain, not comparing any difference in cost of handling, of 34.4 per cent.—J. M. Baker.

Canning of Fruits and Vegetables in Louisiana

Commercial canneries in Louisiana packed 2,118,000 cases of fruits and vegetables valued at $5,500,000 during the season ending in the spring of 1947. This quantity represents an increase of 133 per cent over 1945, and 87 per cent over 1941. There were 25 canneries in the state in 1947, of which 20 operated during the 1946-47 season. Seven new canneries operated for the first time.

The sweet potato pack in 1946-47 amounted to 1,626,000 cases, which was three times the 1945 pack, and four and one-half times the 1941 pack. Sweet potatoes comprised 77 per cent of the total fruit and vegetable pack in the state. The output of most canned products was greater in 1946 than in the previous season, but, except for sweet potatoes, considerably less than in 1941. Okra and snap beans were second and third, respectively, to sweet potatoes in importance for canning.

Eighteen canneries packed sweet potatoes in 1946-47 compared with 10 in 1941, and the average output per cannery was three times as great. About 91 per cent of the pack was in light syrup. Promotion and advertising of canned Louisiana sweet potatoes and greater emphasis on quality of pack are likely to stimulate consumer demand. The availability of sugar and removal of restrictions on the use of tin now permit canners to put up a high-quality, heavy-syrup pack in the sizes of cans desired by the trade.—M. D. Woodin and K. E. Ford.

The Cost of Farm Fences

An economic study of farm pastures in the Mississippi River Delta Cotton Area of Louisiana was made by the Louisiana Agricultural Experiment Station in 1946. It was found that at 1946 prices the average cost of building a four-strand barbed-wire fence was $237.53 a mile, or 74 cents a rod. The cost of constructing a woven-wire fence was $374.81 a mile, or $1.17 a rod. The cost of maintaining farm fences in-

volves charges for depreciation, repairs, and interest. The annual cost of maintaining a four-strand barbed-wire fence was $23.58 a mile, or 7.4 cents a rod, at 1946 prices.

Repairs—including the cost of posts, staples, and labor—comprised the most important item of cost in maintaining a barbed-wire fence, amounting to $12.71 a mile. Other maintenance costs were $5.94 a mile for interest and $4.93 a mile for depreciation.

The annual cost of maintaining a woven-wire fence with three strands of barbed-wire at the top was $35.24 a mile, or 11 cents a rod. Depreciation was the most important item of cost in maintaining woven-wire fence, amounting to $12.97 a mile as compared with $12.90 a mile for repairs, and $9.37 a mile for interest.

The per acre cost of building and maintaining farm fences is dependent to a large extent on the size of the field. While a 160-acre field is four times as large as one of 40 acres, the distance around the larger one is only twice as much as around the smaller one, assuming both fields are square. To enclose the 40-acre field, a mile, or 320 rods, of fence would be required, while to enclose the 160-acre field, 2 miles, or 640 rods, of fence would be required. At 74 cents a rod the cost of fencing the 40-acre tract would be $5.92 an acre and of fencing the 160-acre tract, $2.96 per acre. As the area enclosed increases, the total rods of fence required increases also; but the cost per acre declines.

Fence maintenance costs per acre vary with the size of field in the same manner as do construction costs. It was found that for square fields the maintenance cost of a 40-acre tract was 56 cents an acre; of an 80-acre tract, 40 cents an acre; and of a 160-acre tract, 28 cents an acre. The larger the acreage enclosed, the lower is the cost per acre of maintenance.—Frank D. Barlow, Jr., and A. R. Cheshire.

Relationship of Days Used to Cost of Tractor Operation

The number of days or hours that a tractor is used annually was the most important single factor causing variations in the cost of tractor operation from farm to farm. The relationship of the number of 10-hour days used per year and the cost of tractor operation is presented in Table 1. Detailed records were obtained on 179 tractors in a Farm

Table 1. Relationship of the number of days used per year and the cost of operation for 179 tractors in the Mississippi River Delta Cotton Area, 1944.

Annual 10-Hour Days of Use	Number Tractors	Average Days Used	Average Operating Expenses Per 10-Hour Day (Dollars)		
			Cash	Overhead	Total
Group:					
Less than 60	32	45	4.25	3.12	7.37
60-89	54	73	3.71	2.11	5.82
90-119	41	103	3.37	1.69	5.06
120-149	36	130	3.20	1.43	4.63
150 and over	16	169	3.44	1.19	4.63
All tractors	179	95	3.60	1.98	5.58

Mechanization Survey in the Mississippi River Delta Cotton Area in 1945. The 179 tractors were sorted and grouped on the basis of the number of 10-hour days used annually. As the number of days of annual use increases, the cost of tractor operation per day and per hour declines up to a certain point.

Tractors that were used less than 60 days a year were used on an average of 45 days, and the average cost of operation was $7.37 a day, or 74 cents an hour. Cash costs were higher for tractors that were used less than 60 days a year because certain servicing charges are annual in nature. The average number of days of use for all tractors was 95, and the average cost per day was $5.58, or 56 cents an hour. For those tractors that were used on an average of 130 days a year, the average cost of operation was $4.63, or 46 cents an hour. Only 16 tractors were used more than 150 days annually, and the average cost of operation was $4.63 a day, the same as for those which were used 130 days annually. Higher operating costs for repairs offset the lower overhead costs for depreciation and interest on these tractors.

On the basis of this analysis of 179 tractors, it appears that minimum costs of operation are achieved when farm tractors are used about 120 days a year, but little or no reduction in cost of operation is achieved beyond 150 days of annual use. Those tractors which are used more than 150 days annually in the Mississippi River Delta Cotton Area are used for rough work in drainage improvement, land clearing, and logging in addition to regular farm operations. This probably accounts for the higher repair costs that largely offset lower overhead costs.—Frank D. Barlow, Jr.

Factors Affecting Rough Gin Preparation of Cotton

Preparation is one of the important factors determining the grade of cotton and denotes the degree of smoothness with which cotton is ginned. It is directly related to the moisture content of the seed cotton, the condition of ginning equipment, and efficiency of operation. During the past few years, the percentage of rough preparation in Louisiana has increased considerably and contributed to the loss of outlets for Louisiana cotton as well as the reduced value of the crop. The losses on the 1944-45 crop in Louisiana due to rough preparation are estimated to have been approximately $1.75 per bale, or about one million dollars.

The largest percentage of monthly ginnings reduced one or more grades because of rough preparation and the greatest number of rainy days and rainfall occur during the months of August and September. In addition, a relatively large proportion of the cotton ginned during these months is picked in a green, immature condition. Although a given amount of rainfall does not have the same effect each year, a given amount during August and September has more nearly the same effect than a like amount later in the season. The same was found to be true for a given number of rainy days.

In each of the four districts in Louisiana an increase in rainfall was accompanied by an increase in the percentage of rough preparation. With an equal amount of rainfall there was a greater percentage of rough cotton in the Upland Cotton Area and the South Louisiana Cotton Area than in the Red River and Mississippi River Delta areas. Any weather condition which increased the moisture content of seed cotton tended to increase the percentage of cotton reduced in grade.

Rough preparation is not due wholly to weather conditions and the ginning of high moisture content cotton. Some of it is due to the gin and ginner. Gins using a loose seed-roll, drying equipment, high saw speeds, cleaning equipment and unit extractor feeders were found to have considerably less rough preparation than other gins. The more modern well-equipped gins had a smaller percentage of rough preparation than did the older obsolete gins.

The grower should promote smooth preparation by furnishing the ginner with cotton in good ginning condition and demanding that the ginner employ those methods that will best preserve lint quality. The ginner should promote smooth preparation through the use of modern gin equipment and efficient procedure in operation.—James F. Hudson.

Smith-Doxey Cotton Classing and Market News Service

Twenty-seven organized Cotton Improvement Groups in Louisiana made application for free cotton classing and market news services under the Smith-Doxey Act during 1947-48. Twenty-one parishes had parish-wide groups and six parishes had community groups. The twenty-seven groups had a combined membership of 22,443 individual producers, who grew 457,318 acres of cotton. Through January 2, 1948, 58,448 samples of cotton had been classed for group members. The number of members, the total acreage planted, and the number of samples classed were all greater than in 1946.

During the 1947-48 season an intensive educational program, to inform growers of the benefits to be obtained through the use of the free classing and market news services, was carried on in three parishes in cooperation with the State Market Commission. The program resulted in a material increase in the use made of the services by growers in these parishes as compared to other parishes in which the services were available, and indicates the need for further work in this direction.—James F. Hudson.

The Baton Rouge Produce Market

A study of the wholesale and retail produce trade in Baton Rouge, and the production and marketing of fruits and vegetables in the nine parishes surrounding the city was completed in 1947. It was found that nearly 34,000 acres are devoted to fruits and vegetables in the nine-parish area. Production amounted to about 2,200 carloads valued at

more than $3,000,000. About 1,650 carloads of fruits and vegetables were consumed in Baton Rouge in 1946. Despite the heavy production of a wide variety of fruits and vegetables in the local area, less than 8 per cent of the consumption of these commodities in Baton Rouge was from local production. The bulk of the commercial production in the area is shipped to other consuming centers, mostly in the North In the nine-parish survey only 35 growers were found who sold a variety of produce in Baton Rouge throughout the year. These growers sold 70 per cent of their production to retail stores. Most of the growers were satisfied with prices received in 1946, but many were of the opinion that marketing costs and margins between producers and consumers were too high. Local growers find marketing in Baton Rouge is costly in both time and money. In 1946, they traveled about 35 miles inside the city and spent 18 hours for each $100 of sales. A conveniently located produce market in Baton Rouge would have made possible considerable savings in time and travel by local farmers.

The study indicates that year-round production of fruits and vegetables in the Baton Rouge area and consumption of fresh produce in the city are large enough to provide the volume of trade necessary for a successful produce market. With sound financing, capable management, convenient location, and cooperation and support of growers, truckers, retailers and wholesalers, a produce market could be established in Baton Rouge that would be of benefit to the community and state.

Other communities in the state have produce marketing problems similar to those in the Baton Rouge area, and the findings of the Baton Rouge study apply rather widely throughout the state. Additional studies of the adequacy of marketing facilities in these other towns and cities are planned.—F. E. Stanley, R. B. Johnson, M. D. Woodin.

Trends in Farm Income and Expenses

Louisiana gross income, total production expense, and net income from farming, 1929 and 1939-47.

Year	Gross Income	Total Production Expense	Total Net Income	Number of Farms	Net Income Per Farm
	Dollars	Dollars	Dollars	Number	Dollars
1929	204,094,000	85,111,000	118,983,000	161,442	737
1939	165,932,000	72,371,000	93,561,000	152,132	615
1940	146,885,000	68,033,000	78,852,000	149,909	526
1941	170,957,000	77,172,000	93,785,000	148,629	631
1942	236,470,000	97,051,000	139,419,000	141,975	982
1943	315,410,000	112,863,000	202,547,000	141,049	1,436
1944	301,691,000	118,079,000	183,612,000	136,009	1,350
1945	321,672,000	119,850,000	201,822,000	133,000	1,517
1946	320,138,000	127,041,000	193,097,000	132,000	1,463
1947	400,172,000	140,380,000	259,782,000	130,000	1,998

—J. P. Montgomery.

Agricultural Engineering

Sweet Potato Machinery and Equipment

For the past three seasons experiments have been conducted to determine the most economical and most satisfactory method of raising early sweet potato plants. Although Louisiana has a normally mild spring, hotbeds for raising early plants are recommended in all except the most southern areas growing sweet potatoes. Holding a correct uniform temperature in the hotbed, which is so essential in plant production, is most easily accomplished when using electricity as a source of heat. Electrically heated hotbeds have turned out earlier plants than either hot water, flue or manure heated hotbeds. When four inches of choppd cornstalks, wood shaving or sawdust was used as an insulating layer between the ground and hotbed proper, the electric consumption for heating was reduced by 30 per cent. Using proper methods and hotbed design, sweet potato plants should be raised in hotbeds for as low as 20 kilowatt hours per 1,000 plants. The hotbed cover did not materially affect the plant growth. Cloth covers proved to be the most economical and satisfactory for use on all sizes of hotbeds.

Several types of standard mechanical elevator chain Irish potato diggers have been successfully used to dig sweet potatoes. After the vines have been removd from the rows the regular Irish potato digger will do a very good job of digging sweet potatoes if all agitators are first removed from the conveyor chain and care is exercised to be sure enough dirt is carried along with the potatoes on the chain to prevent bruising. Increase in yield from this method of digging as compared to the plow and middle buster averaged 20 per cent.

A new type of potato harvester was tried this past season. This machine digs and sacks the potatoes in one operation, thereby eliminating the labor for gathering after digging. While this machine reduced the labor for harvesting by 300 per cent, bruising was much too great for fresh market sale or storing. However, this type of harvesting is ideal for potatoes harvested for the cannery or to be dehydrated for stock feed. Next season this machine will be equipped with a side elevator for bulk handling of the potatoes. This would eliminate the use of sacks and crates and further reduce labor and time for harvesting.

A machine was tested this year for harvesting the sweet potato vines for feed. This machine was composed of four sets of finger wheels which could be set to either pull the vines from the row or pile them on top of the row for gathering with a regular forage harvester for dehydration. An excellent job of removing the vines from the field was accomplished with this equipment; however, too much dirt was gathered in the process for the vines to make a high-quality hay. Investigations to correct this difficulty will be continued for another season.

—Wiley D. Poole.

Drainage Research for Sugar Cane Land

Volume cut crowning (turtlebacking) over experimental one-cut work reduced the costs on the Westover test area. The costs were reduced from $16.59 to $7.20 per acre for the Parsons Whirlwind terracer, and from $29.94 to $11.72 per acre for bulldozer. Working the cuts in block of two long, disregarding the head lands, reduced the costs $2.71 per acre and the time per acre by 1.86 hours.

Yield on the crowned areas in 1947 showed increases of 27.52 bushels of corn per acre; 1.98 standard tons of cane; and 359.68 pounds sugar per acre.

Three different manufacturers are making the sloping-side bucket developed at the project and approximately 30 are now in use in the cane territory in conjunction with straddle draglines.

Experimental work with water lubrication of the point and blade of the mole drainage machines showed a reduction of 23 per cent in the horsepower required to pull the machine.—I. L. Saveson.

Sprayer From Oil Drum

A light sprayer constructed from an oil drum, a gear type 5-gallon-per-minute pump, a 1-horsepower air cooled engine, and a few pieces of pipe and valves proved most popular. This unit has been used successfully for applying several of the weed poisons and also as an orchard spray unit. The unit can be made by any small shop or any individual handy with tools. More than 100 sets of blueprints for making this machine have been distributed.—Harold T. Barr.

Animal Industry

Sweet Potato Meal for Fattening Cattle

Four lots of calves—purebred or high-grade Aberdeen Angus steers and heifers—averaging 396 pounds initial weight were fed out on corn and dehydrated sweet potato meal as follows: Lot 1—Corn; Lot 2—corn 2/3, sweet potatoes 1/3; Lot 3—corn 1/3, sweet potatoes 2/3; and Lot 4—sweet potato meal only. All lots received cottonseed meal as the protein supplement, together with prairie hay and some alfalfa hay.

The calves were fed 118 days. The daily gains were: Lot 1 (corn)—1.77 pounds; Lot 2 (sweet potatoes 1/3)—1.55 pounds; Lot 3 (sweet potatoes 2/3)—1.64 pounds; and Lot 4 (dried sweet potatoes full ration)—1.57 pounds. Disregarding Lot 2, in which two calves failed to do well, the dehydrated sweet potato feed was worth 90 per cent as much as corn. As the potato feed cost $65 per ton, compared to corn and cottonseed meal at $98, the calves receiving the most potatoes made the highest profits. Profits not including labor were as follows: Lot 4—$28.55 per head; Lot 3—$27.91; Lot 2—$18.09; and Lot 1—$18.87. The calves in the sweet potato lots ate a little less feed than those in the corn lot.

Appraised values by two experienced cattle buyers showed little difference in value per 100 pounds between lots, but the lots making the higher daily gains showed the highest value per head. The carcass grading showed a slightly higher value for Lot 1, which graded high-medium, compared to a medium grade for the other lots.

—S. E. McCrane, C. I. Bray, Lee Berwick, C. B. Singletary, R. M. Crown, and J. B. Francioni, Jr.

Calves fattened on dehydrated sweet potato feed, cottonseed meal, and hay make good profits.

Grazing Brood Sows on Oats

Seven bred sows grazing on approximately 1½ acres of headed oats from May 16 to July 10 gained 85 pounds per sow. In addition to the oats they received 300 pounds of protein supplement.

At farrowing time the seven sows were in good thrifty condition, without any excess fat. They farrowed an average of 10 pigs per sow averaging 2.95 pounds each.—C. B. SINGLETARY.

Selection and Improvement of Duroc-Jersey Swine

Four Duroc sows qualified for Production Registry. One of these sows was a junior yearling and the other three gilts. LES Actina Special raised two litters of ten pigs each for a total weight of 754 pounds, an average of 37.7 pounds per pig at eight weeks of age. In addition 4 more of her pigs were raised on other sows.

Duroc sows and their qualifying litters in 1947
(2 litters each)

Name	Pigs Farrowed	Pigs Raised	Av. Wt. Per Pig	2 Litters Wt. at 56 Days
LES Coleen 11	24	19	34.55	656.5
LES Marquita 10	21	16	38.41	614.5
LES Actina Special 410	26	20	37.72	754.3
LES New Honduras 20	19	18	38.09	685.7

Duroc pigs from these lines of breeding made gains of 2.03 pounds per day on a standard corn ration in 1947.

This herd has recently qualified as the first production accredited herd of any breed, with 10 out of 15 litters getting official Production Registry qualification. The herd also ranked second in average production in the "B" division (herds under 12 sows) of the Duroc herd testing program in 1947.—C. I. BRAY.

Aged Duroc sows make good production records.

Hogs fed corn and dehydrated sweet potatoes made higher gains than on corn alone in 1948.

Dehydrated Sweet Potatoes as a Carbohydrate Feed for Fattening Swine

For three consecutive winters experiments have been conducted in fattening pigs on dehydrated sweet potato meal fed at different levels in comparison with corn. The pigs had an average initial weight of 115 pounds and were finished at approximately 225 pounds. The sweet potato feed fed in 1947 and in 1948 was of excellent quality, being made from sound, washed cull potatoes. The proportions of corn and dehydrated sweet potato meal fed were as follows: Lot 1—corn; Lot 2—corn 2 parts, sweet potato meal 1 part; and Lot 3—corn 1 part, sweet potato meal 2 parts. Each lot received a protein supplement consisting of tankage, soybean oil meal, and alfalfa leaf meal.

The following are the average results for the two latest years of the test. The meal used in 1946 was not of good quality and the results for that year are not included.

Lot	*Ration*	*Average Gain per day*	*Feed per 100 lbs. Gain*
1	Corn	2.015	390
2	Corn 2, sweet potatoes 1	1.985	410
3	Corn 1, sweet potatoes 2	1.820	419

The sweet potato feed averaged 89 per cent the value of corn in 1948 and 88.7 per cent in 1947. In 1945 the potato feed made from grade material was worth 66 per cent as much as corn.—C. B. Singletary.

Crossbreeding Swine

The litter shown in the picture is the seventh continuous cross in a three-way crossbreeding test. The dam is a full sister to the champion barrow in the open class of the 1947 state-wide livestock show at L. S. U. Bred to a Duroc sire, she farrowed and raised 10

Crossbred pigs averaged 220 pounds weight at 186 days and required only 361 pounds feed per 100 pounds gain.

pigs averaging 36.6 pounds per head at 56 days of age, an excellent record for a gilt. These 10 pigs, fed out during the winter of 1947-48, weighed 2,200 pounds at 186 days of age and required 361 pounds feed for 100 pounds gain, as compared to 390 pounds average for purebred swine on the same ration—C. I. Bray and C. B. Singletary.

Wintering Cows on Forest Range

(In cooperation with the Southern Forest Experiment Station)

This experiment is being conducted on a forestry plantation of 1,200 acres controlled by the Southern Forest Experiment Station. The cattle used are owned by Dr. D. V. Donaldson and Mixon Bankston of Dry Prong. Range cows, calves and yearlings were divided into three approximately equal groups and fed varying amounts of cottonseed meal, approximately 1½ pounds, 2½ pounds, and 3½ pounds per day. Relative gains were as follows: Lot 1, 3½ pounds meal—42 pounds; Lot 2, 2½ pounds meal— 23 pounds; and Lot 3, 1½ pounds meal—8.0 pounds.

Cows on the lowest level of feeding, which lost most weight in the winter of 1946-47, made slightly greater gains from March 14 to November 13 than did the cows which had been fed the heavier amounts.

—C. I. Bray, John T. Cassidy, Mixon Bankston, C. B. Singletary.

Grazing Winter Oats

Ten grade Hereford cows averaging 945 pounds grazing on 12 acres of winter oats, with a limited amount of baled hay, were compared with a similar group grazed on 40 acres of dry meadow with

Winter feeding with cottonseed cake on forest range, Dry Prong, 1947.

access to stacked hay. In 56 days (Jan. 6-March 3) the cows grazed on oats 7 half-days, 12 days daytime only, and were kept off oats entirely for 11 days because of wet weather. The last 26 days they were left on oats continuously.

The cows grazed on oats lost 8 pounds per head and the cows on dry pasture lost 27.5 pounds per head. As these cows were in excellent grass fat condition at the beginning of the test, the losses in weight are not significant. The cows on dry meadow were estimated to have consumed between 15 and 17 pounds of hay per day during the test. The cows on oat pasture ran on dry meadow when not on oats and were fed baled hay amounting to between 280 and 300 pounds per cow during the first 30 days.

—S. E. McCraine, Doyle Chambers, and C. B. Singletary.

Hill Land Pasture Investigations

Donaldson Pasture, Dry Prong

Cows grazed principally on fertilized pastures between May 2 and November 13 gained on an average 80 pounds more than those entirely on unfertilized pasture and appeared in much better condition. Cows that had calved prior to May 2 gained 60 pounds on fertilized pasture and lost 36 pounds on unfertilized woodland pasture. Cows calving between the above dates gained 8 pounds on fertilized pasture compared to a loss of 71 pounds on forest pasture. Dry cows gained

Cows grazed on winter oats, end of test March 3, 1947.

148 pounds on fertilized pasture and 86 pounds on unfertilized pasture. Because of dry weather, all cows were taken off the improved pastures from July 3 to September 12.

Blood samples were taken in December from a limited number of cows of each group. Analysis by Dr. L. L. Rusoff showed that all cows that had been part-time on improved pastures had a safe margin of blood phosphorus averaging 3.66 mg. per 100 cc. of blood serum, while most of the cows grazed entirely on unimproved pasture were averaging 2.63 mg. per 100 cc. serum. A blood content of 3.00 mg. phosphorus per 100 cc. serum is probably the lowest minimum compatible with health, though amounts this low may be expected in winter on dry forage.

—C. I. Bray, C. B. Singletary, Mixon Bankston, and John T. Cassidy.

Fuller Pasture, Calhoun

Twenty-one head of cattle grazed on 15 acres of limed and fertilized pasture from March 28 to July 14 made a total gain of 3,981 pounds, an average of 265 pounds per acre. Because of lack of rainfall, grazing was discontinued July 14. The gain, however, was only 7 pounds less per acre than for the full grazing season in 1946. Ten acres fertilized for the first time in 1947, but not limed, produced 127 pounds of beef per acre, as compared to an average of 78 pounds per acre with no fertilizer in 1944-45-46. This pasture is not yet built up to full capacity. Fertilizer used on both pastures was 400 pounds of 3-12-12.

C. I. Bray, Dawson Johns, J. L. Heath, R. Fuller.

Renovating Beef Cattle Pastures

The pasture that produced the greatest amount of gains in 1947 was plowed and reseeded in the winter of 1945. Two pastures planted to winter oats in the fall of 1946 and reseeded lightly with white Dutch clover and Dallis grass were grazed only lightly but produced more gain than those not replowed, and made practically the same gain as the No. 1 pasture, which had been disced and reseeded. The application of phosphate and potash fertilizer to Field 4 resulted in only a slightly better gain than on the check lot.

Eighteen steers made average gains of 274 pounds per head in 169 days, or 1.62 pounds per day.

Lot	Treatment	Gain Per Acre
1	Disced and reseeded	250.0
2	Oats, 1946-47—reseeded, lightly grazed in 1947	245.8
3	Check, no treatment since 1938	132.0
4	Fertilized, light seeding of clover	186.6
5	Plowed and reseeded, winter 1945	352.0
6	Corn 1946—oats 1946-47—reseeded, lightly grazed in 1947	254.0

—C. I. Bray, S. E. McCraine, and C. B. Singletary.

Special Pasture Investigations

The outfield test in Beauregard Parish on the farm of H. Lyles has been conducted for three years. Plots that were treated with 2,000 pounds of lime and 400 pounds of 4-12-8 fertilizer, seeded to Dallis grass, white Dutch clover and lespedeza, and given an annual application of 200 pounds of 0-14-7 fertilizer have continued to increase beef produced per acre. These plots have a three-year average of 262 pounds of beef per acre per year.

Plots that were treated the same and seeded the same with the addition of carpet grass have decreased in yield every year. The carpet grass has taken over and, not being as nutritious, has decreased the yields to 186 pounds of beef per acre per year. The carpet grass has decreased the stand of clover and Dallis grass.

This test seems to indicate that lime is very essential. Plots with the same fertilizer and seed treatment without lime yielded only 152 pounds of beef per acre. The clover growth seems to be the main difference. Where lime and fertilizer were applied and Dallis grass, carpet grass and lespedeza seeded, the yield of beef was only 157 pounds per acre per year.

One plot seeded to Dallis grass, lespedeza and white Dutch clover has been treated for the past two years with 400 pounds of 0-14-7 per acre instead of 200 pounds. This plot produced 505 pounds of beef per acre in 1947.

This test shows that lime and fertilizer are necessary to produce a profitable pasture. The check plot, which was seeded but not treated, has a three-year average of 13 pounds of beef per acre per year. Plots seeded and treated with only phosphate gave a yield of 112 pounds of beef per acre.

The outfield test in Franklin Parish on the farm of Mr. N. C. Moore seems to indicate that the combination of lime and fertilizer is required to get a high increase of beef per acre on the Macon Ridge. The check plot seeded to Bermuda, Dallis, lespedeza, and white Dutch clover gave a yield of 317 pounds of beef per acre. The plot that was seeded the same but received 200 pounds of 0-14-7 annually gave 370 pounds of beef per acre. The same seeding and fertilizer treatment with the addition of lime gave a yield of 560 pounds of beef per acre.

In this test it appears that annual applications of fertilizer are necessary. On plots that missed one annual treatment the yield of beef per acre is 360 pounds. The average of the plots receiving annual application of 200 pounds of 0-14-7 is 454 pounds of beef per acre.

The outfield test in West Carroll Parish shows the same as the test in Franklin Parish. Plots without any treatment gave 331 pounds of beef per acre. When fertilizer was added the yield increased to 399 pounds. When both lime and fertilizer were added the yield of beef per acre was increased to 563 pounds.—W. E. Monroe.

Crops and Soils

Cotton Investigations in 1947

Variety Trials—Cotton variety tests were conducted at the Baton Rouge, St. Joseph, and Calhoun stations. These tests consisted of the principal commercial varieties and the more promising advanced and new strains from the Louisiana station and substations and from out of state breeders. Detailed reports on each of these tests at these three locations are available and may be obtained upon request from the Louisiana Agricultural Experiment Station, Baton Rouge; Northeast Louisiana Experiment Station, St. Joseph; and North Louisiana Agricultural Experiment Station, Calhoun.

The highest yielding varieties and strains at each of these stations were as follows: Baton Rouge—La. 33, La. 47, Empire, Stoneville, Deltapine, and Coker strains; St. Joseph—Delfos, Deltapine and Stoneville, Coker, and Hi-Bred; Calhoun—La. 33, La. 47, Stoneville, Deltapine, and Miller.

Breeding—Cotton breeding work of the Louisiana Agricultural Experiment Station is carried on at the main station at Baton Rouge and the substations at St. Joseph and Calhoun. The work will be expanded in 1948 to include the new Red River station near Shreveport. Approximately 300 progeny rows were grown at Baton Rouge, 50 at St. Joseph, and 25 at Calhoun. These were planted from the seed of plant selections made in 1946 which were obtained for the most part from lines and hybrid material left by Dr. H. B. Brown upon his retirement.

The hybridization, backcrossing, wilt studies, general routine work of self-pollination of progeny rows and the isolation of superior strains will be concentrated in Baton Rouge. The substations will be the testing and multiplication centers for superior strains developed at the experiment station.

The length, tensile strength, and per cent of lint are being determined on 4,000 initial plant selections, 1,500 plant selections from progeny rows, 1,000 selections from inbred lines and material for genetic studies, and 1,000 plant selections from the wilt studies, conducted in cooperation with the U. S. D. A., making a total of 7,500 plant selections.

Fiber Studies—The Louisiana Experiment Station has established a modern fiber laboratory for testing tensile strength by use of the Pressley tester and fiber uniformity by the use of a fibregraph. The initial plant selections and selections from existing progenies will be tested before the planting season. This procedure eliminates inferior material before it is grown in progeny rows.

The Louisiana Experiment Station cooperated with the U. S. D. A. in a regional spinning test of commercial varieties, conducted in conjunction with the variety trials at Baton Rouge, St. Joseph, and Calhoun stations.

Greenhouse Work—The first generations from 72 crosses are being grown in the experiment station greenhouse this winter. Next summer the second generations and backcrosses will be grown in the field. This will enable the selection and testing program to begin a year earlier than would have otherwise been possible. Eighty superior plants were cut back and brought into the greenhouse in October. In addition to preserving these plants another crop of seed will be produced during the winter.

An associate agronomist and research associate in fiber technology have been added in cotton breeding. Also, an associate agronomist and senior pathologist of the U. S. D. A. are working with the over-all cotton breeding program.

—F. W. Self, John R. Cotton, Willie K. O'Quin, and C. C. Murray.

Nitrogen Changes in Flooded Soil Planted to Rice

A study to determine and evaluate the nitrogen changes that take place in flooded soil planted to rice has been conducted in the greenhouse using Crowley silt loam, pH 5.6, and Lake Charles clay loam, pH 6.8. Six kilograms of each soil were placed in 3-gallon jars and treated with 800 pounds per acre of 0-12-12 or 12-12-12 fertilizer. Rice was planted in the soil in half the jars in April. The others were left unplanted. When the plants were about 12 inches high the soil in all jars was flooded to a depth of approximately five inches, using 6 liters of distilled water. After flooding, copper sulphate solution was added to the flood water in half the jars at the rate of 1.5 p.p.m. to prevent the growth of algae. Ammonium-nitrogen and nitrate-nitrogen content and pH were determined on the flood water at intervals during the growing season. The rice was harvested and the plants were analyzed for total nitrogen. Total nitrogen determinations were also made on the soil and roots in each jar.

There was an increase in nitrogen in the soil, water, and plant system on both the Lake Charles and Crowley soils. The gain in nitrogen in the Crowley series was approximately equivalent to the nitrogen content of the rice plants. The increase in the Lake Charles series was slightly more than that in the Crowley soil. Additions of nitrogen at the rate of 96 pounds per acre increased the yield of rice about 45 per cent and increased the nitrogen content of the plants on the Crowley soil. Additions of nitrogen to the Lake Charles clay loam increased the yield of rice about 33 per cent but did not appreciably increase the nitrogen content of the plants. Ammonium nitrogen appeared in the flood water in quantities varying from 0.1 to 5.0 p.p.m. during the growing season. The smaller quantities were present on the planted soils but the amounts were not in proportion to the applications of nitrogen. Nitrate nitrogen did not persist in appreciable quantities under any condition. The reaction of the flood water increased from

an initial pH 5.7 to pH 7.8 on the Crowley silt loam and to pH 8.3 on the Lake Charles clay loam. The alkalinity was greater in the water on both soils where the crop was not present. The pH of the Crowley silt loam decreased during flooding where nitrogen as ammonium sulphate was added. Without nitrogen the pH increased. The pH of the Lake Charles clay loam increased in all cases. It was apparent that the increase in nitrogen was not due to the presence of algae in the water. Anaerobic nitrogen-fixing bacteria of the genus Clostridium were found to be present in the Crowley soil in large numbers. These organisms probably are responsible for the increase in nitrogen since the conditions prevailing in soils during the growth of rice are especially favorable for their growth. The quantities of nitrogen fixed apparently were not related to the amounts of nitrogen added and were not sufficient to replace the fertilizer nitrogen being applied to rice soils. However, the nitrogen fixation is probably responsible for preventing a more rapid decline in nitrogen fertility in soils planted to rice. For example, one plot planted to rice for the last 54 years at the Rice Experiment Station has never received any fertilizer but has produced an average of 23.6 bushels of rice per acre since 1920.

Apparently the increase in nitrogen that occurs in the presence of the rice crop compensates for the loss of ammonium nitrogen that has been observed as the flood water becomes alkaline on unplanted soil at high temperatures.—W. H. Willis and M. B. Sturgis.

Minor Elements for Clovers, Lespedeza, and Soybeans on Oberlin Silt Loam and Bowie Fine Sandy Loam

Greenhouse pot studies were made on soils shown to be deficient in the nutrient elements by chemical laboratory methods. An effort has been made to more definitely determine these deficiencies and to collect data on the response of indicator plants to major and minor elements.

Top soil of Bowie fine sandy loam was collected from a tung orchard on Hill Crest Plantation near Husser, Louisiana, in Tangipahoa Parish. Top soil of Oberlin silt loam was taken from a check experimental pasture on the Moore farm near Oberlin, Louisiana, in Allen Parish.

The soils were sieved through a ½-inch screen and mixed thoroughly before putting equal amounts in glazed 2-gallon pots. Lime, fertilizer, and minor element applications to these soils were calculated on the weight basis, assuming 2,000,000 pounds of soil to the plowed acre. All chemicals used were of reagent grade except where otherwise indicated. The basic rate of fertilizer application was 600 pounds per acre of 3-12-12. Calcium carbonate or dolomitic lime was added at the rate of 2,000 pounds per acre to the Bowie fine sandy loam for lespe-

deza and 3,000 pounds per acre for soybeans. Pure calcium carbonate and magnesium carbonate were used in proportions to equal dolomite where this type lime is indicated. Zinc sulfate was used at the rate of 30 pounds per acre, copper sulfate at 35 pounds per acre, and borax at 20 pounds per acre. All fertilizers and lime were weighed out carefully and mixed thoroughly with all of the soil in each pot before plantings were made and the moisture brought to optimum. Each treatment was replicated three times. Kobe lespedeza and Acadian soybeans were planted to the pots and when growth was well under way each pot was thinned to five plants. After growth became quite slow, the crop in each pot was clipped, dried in the oven, and weighed.

The same rates of application of fertilizer and minor elements were used on the Oberlin silt loam except that in addition manganese sulfate was used at the rate of 30 pounds per acre. The Oberlin silt loam was limed at the rate of 2,500 pounds per acre for red clover. In one treatment no sulfates were used. Copper, manganese, and zinc were added as acetates and nitrogen was supplied as sodium nitrate instead of ammonium sulfate. The fertilizers and lime were mixed with all of the soil in each pot and moisture brought to optimum before plantings were made. Each treatment was replicated twice. Red clover was planted on the Oberlin silt loam soil in glazed 2-gallon pots. After six months of growth the clover was clipped, dried in the oven and weighed.

Lespedeza on Bowie fine sandy loam showed a highly significant increase in yield from the use of zinc and boron added with a 3-12-12 fertilizer and dolomitic lime. Soybeans on Bowie fine sandy loam gave a highly significant increase in yield from the use of zinc, copper, and boron in combination with a complete fertilizer and dolomitic lime. Both lespedeza and soybeans showed severe burning of the foliage when treated with 20 pounds of borax per acre, but in spite of this showed significant increases in yield when borax was added with a 3-12-12 fertilizer and dolomitic lime. The results show that the use of copper and boron together were not more effective than borax alone. Soybeans would probably have shown higher increases in yield from the use of minor elements if boron had been used in smaller amounts

Red clover grown on Oberlin silt loam gave the highest yield from the use of copper, boron, and zinc in combination with a 3-12-12 fertilizer and dolomitic lime. This increase in yield was highly significant A highly significant decrease in yield resulted from the use of manganese applied with zinc, copper, and boron and a complete fertilizer with dolomitic lime. The depressive effect from manganese was overcome when no sulfates were included in the fertilizer and zinc, copper, and manganese were added as acetates. Nitrogen in combination with phosphorus, potassium, and minor elements and dolomitic lime stimulated growth at first, but the final yield was no better than when no nitrogen was used.—C. W. McMichael.

The Analysis of Soils for Fertilizer and Lime Recommendations and Soil Fertility Studies

During 1947 about 2,200 soil samples were analyzed by the Soils Laboratory, and recommendations were made for the application of lime and fertilizer for the crops to be grown throughout the state. Soil samples were also analyzed from the outfield experimental plots to assist in correlation of the results of soil analysis with crop response to fertilization. Interest in soil analysis has been shown in some areas from which few samples have been received in the past, particularly in some of the alluvial areas.

Some farmers and agricultural workers are reporting apparent deficiencies of phosphorus and potassium in some of the Red River soils, and the need for their general use is sometimes implied. It is known that these elements are occasionally deficient, particularly in the sandy soils, but they are not deficient in enough areas to warrant their general use. To do so would not be profitable to most farmers on these soils, and scarce materials would be used which are needed in other areas. The results of fertilizer experiments and the analysis of many soil samples show that nitrogen is the only fertilizer that is generally needed in the Red River bottom soils.

Because of the general acid condition and low fertility of the Coastal Plain upland, Coastal Plain flatwoods, Coastal Prairie, and Mississippi River terrace soils, much more effort should be made for the application of lime and fertilizer to these soils and the planting of legume-grass mixtures for the purpose of improving and conserving them. Only a small percentage of the lime and fertilizer requirements are being met in these areas.

—W. J. Peevy, C. W. McMichael, R. H. Brupbacher, and W. K. O'Quin.

Seed and Forage Production of New Strains of Dallis Grass

Sixteen new strains of Dallis grass were compared for seed and forage production on second year sod. From the results it appears that certain strains are superior to the rest for both. The better strains for forage are more persistent in the sod than others. This is possibly due to resistance to certain foliage diseases and to inherent tendencies toward vigor in vegetative growth. With some exceptions, seed production in row plots appears to have a close relationship with forage production in sod plots. However, there are exceptions which are evident by the variation in the forage seed ratio among the strains. The range in this factor was from 46.4 to 29.1 for the entire season; that is, for the growing season of 1947 in a certain strain, 46 pounds of forage were produced for each pound of seed and in another only 29 pounds of forage for each pound of seed resulted. Seasonal fluctuations appeared to be influential with this relationship. In June the ratio ranged from

56:1 to 27:1; for August, 17:1 to 12:1; and October, 27:1 to 17:1. It is noteworthy that a particular strain produced the widest ratio for each harvest.

Considering the general relationship between seed and forage production, correlation coefficients of .9848, .9919 and .9820 were obtained for June, August and October. The significance of such values is unquestionable. It is evident that high forage productivity is necessary for maximum seed yields.

Differences in vigor exhibited in progenies of Dallis grass. Row at right of stake represents less vigorous types.

Seed yields of 705 pounds were harvested from one of the better strains. This was accompanied by 26,024 pounds of green forage. The lowest yield for one strain was 18,271 pounds of forage with 484 pounds of seed. The seed yields are the result of three harvests in June, August and September. Forage clippings were made at monthly intervals from April until October. The average forage yield for the 16 lines for each month were April, 1,312; May, 3,326; June, 5,749; July, 3,126; August, 2,693; and October 4,939 pounds per acre. The low yields in July and August were due to the exceptionally dry weather during that time.

—C. R. Owen.

Clover and Lespedeza Breeding

The results of the preliminary surveys in the germ plasm of native stocks of red clover, white clover, and lespedeza are evidence of the possibilities for improving these species. The extent of variation within each is sufficient to provide for the formation of varieties and strains

considerably better suited for conditions in Louisiana than any to be found at present. Since the growth habits of these species are considerably different, they will be discussed separately. The tests for red clover, white clover and lespedeza were planted on Olivier silt loam soil. Fertilizer and lime applications were made in accordance with recommendations of the soil testing laboratory.

Red Clover—Differences in maturing dates of progenies of selections from native red clover were found to be four weeks. The late progenies produced three times the tonnage of the early progenies when each was cut at the full bloom stage. There was a third group which reached full bloom stage about midway between the early and late types. It was also intermediate in yield of forage. The average yield of the three groups was 5,114, 10,463 and 14,076 pounds per acre, respectively, for the early, medium and late. The date on which each type was cut was May 7, May 21 and June 1. The second cutting was made when the seed were mature. This was, on the average, about eight weeks after the first cutting and was as follows: early group, the first week in July; middle group, July 22; and the late group, August 1. The yield for forage and seed for types harvested later than July 7 was no doubt adversely affected by the dry weather. In order of maturity dates, the average yield of forage was 5,698, 3,280 and 2,663 pounds per acre. Seed yields in similar order were 194.5, 152.4 and 108.3 pounds per acre as an average for each group. There were 16 progenies

Red clover progeny rows. Late maturing type shown on left; row at right at seed harvesting stage.

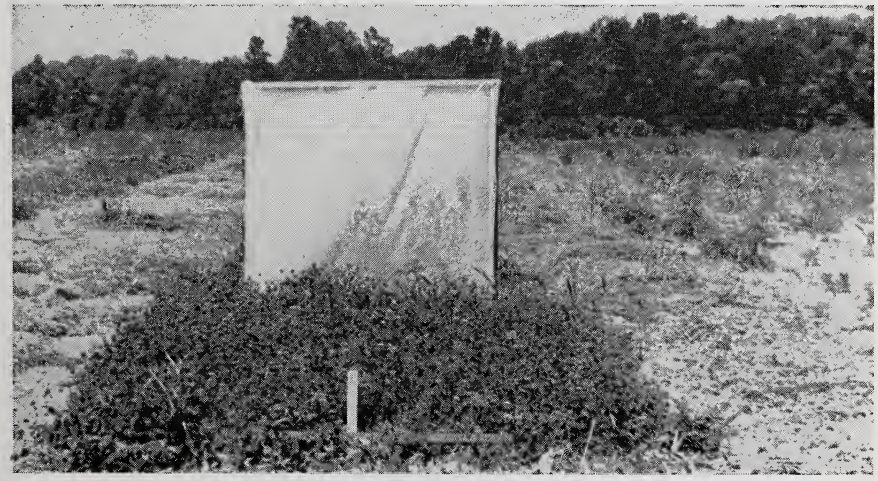
in the early group, 47 medium and 37 late in a test with 100 entries.

The progenies were planted in a triple lattice design using three replications. The plots consisted of two rows 3½ feet wide and 14 feet long.

White Clover—Individual plants selected in 1946 for heat tolerance were transferred by clones to test plots for testing last season. Twenty-five plants were transplanted in a lattice square design using three replications.

The results of the plants tested show clearly that considerable improvement can be made in Louisiana white clover for heat tolerance. Almost all the plants in the test remained on the plots during the summer months. There was not much growth observed after hot, dry weather began and no harvests were made after July 1. The stolons lived, however, and vigorous vegetative growth commenced in September. There was a difference between plants in their ability to maintain cover during these months as measured by area of spread and per cent cover of the soil surface inside the limits of the spread. The difference in seed and forage yield was highly significant. There was also considerable variation in color of leaves, size of stolons and density of cover on the ground.

Lespedeza—In spite of the late planting of May 1, a very good growth was made by annual lespedeza. Kobe and Korean exceeded the forage yield of Common significantly. From the results of 1947, Kobe and Korean should be chosen for hay, but might be undesirable in permanent pasture, even if they reseeded satisfactorily. The upright growth habit of these types tends to crowd out other plant species, whereas the spreading habit of Common permits grass species to remain in the mixture.



White clover line showing excellent forage cover and prolific seeding.

Seed of Common lespedeza collected from different commercial sources varied significantly in forage production. Differences of one ton of hay per acre resulted from different sources of seed. New lines from outstanding progeny of 1946 exceeded the average of the commercial seed significantly, but certain commercial seed lots gave yields equal to those of the best of the new lines.—C. R. Owen.

The Nature of Competition Among Selected Grasses and Legumes and Natural Invaders in Louisiana

A preliminary investigation of pastures and meadows in Louisiana was initiated in 1937. As a result, four species were selected for a comparative study of their growth responses under field conditions. Carpet grass, bermuda grass, lespedeza and white clover were sown alone and with each of the other species in ten different seeding arrangements and at five soil fertility levels on 320 replicated plots in 1937 on Olivier silt loam at the Louisiana Agricultural Experiment Station at Baton Rouge. Their responses were studied through the ensuing eight years. The fertilizer treatments in addition to (1) the untreated areas, included (2) basic slag, (3) superphosphate, (4) nitrate of soda, superphosphate, and muriate of potash, and (5) nitrate of soda. Several methods of measuring the response of the different species were employed and the results compared. A modified permanent chart list quadrat method was utilized in the botanical analysis of the vegetation throughout the period of study.

On soils similar to those reported in this investigation and under the climatic conditions which prevailed, the following conclusions would apply. The inclusion of bermuda grass and white clover in the seeding mixture is of little value unless ample applications of a complete fertilizer are made. The more desirable species, bermuda grass and white clover, may be encouraged to invade a pasture and contribute materially to its productive capacity by the application of complete fertilizers, adequately high in nitrogen and phosphorus. In the event that a high state of soil fertility is not maintained, carpet grass and lespedeza may be expected to predominate. Essentially as much cover of either bermuda grass or of carpet grass may be expected from invasion in a pasture after the third year as from an original seeding, depending upon the relative degree of soil fertility maintained. Fairly heavy rates of seeding may be expected to hasten establishment and increase the cover of a given species during the first two years. When sown in a mixture with another species, half the rate used when seeded alone may be expected to produce equally as much cover after the second year. A given species offers effective competition in a pasture association only when the environmental factors are favorable to its establishment. The competitive ability of a species is not constant but varies with the alternating responses of the other species grown in as-

sociation. The maintenance of fertility seems to be of greater importance in the establishment of the more desirable species in pastures than does the seeding of these species. The permanent chart quadrat method of herbage analysis is well adapted to pasture research, particularly with the mat forming species.—JOHN P. GRAY.

Hybrid Seed Corn Increase

The Louisiana Agricultural Experiment Station has been assisting the Louisiana Hybrid Seed Corn Association, Inc., in increasing seed stocks of Louisiana hybrids. Commercial seed of each of the hybrids released by the Experiment Station is produced by members of this association.

The production of seed for hybrid corn involves three separate steps, namely: (1) production of inbred seed, (2) production of single-cross hybrid seed, and (3) production of double-cross seed.

Inbred Lines—The production of seed from inbred lines is accomplished in various ways. For the most part, these seed have been produced at the Experiment Station at Baton Rouge by hand pollination and by using seed from the pollen parent rows in single-crossing plots.

Single-cross seed of hybrid corn produced on E. C. Woodyear farm, Mound, La.

In 1947 four one-acre plots were planted to four different inbreds for the purpose of increasing seed stocks. The yields were low in two plots owing to poor pollination and late planting. However, one plot at N. W. McHenry's, Monroe, which was irrigated, made over 500 pounds of seed. The other plots were at the Louisiana State penitentiary, Angola. Use of isolated plantings for increasing inbred seed will be expanded in 1948.

Single-Cross Seed—Fourteen plots with a total of 63 acres were planted for single-cross seed production in 1947. For the plots as a whole, production of seed was relatively low, which was due largely to extremely dry weather. One plot, however, which was produced by E. C. Woodyear, Mound, Louisiana, gave a record production for Louisiana. This plot produced over 400 pounds of cleaned seed per acre. Enough single-cross seed was produced to allow an increase in the total double-cross acreage in 1948.

Double-Cross Seed—Members of the Louisiana Hybrid Seed Corn Association, Inc., produced over 15,000 bushels of seed of Louisiana hybrids in 1947. This represents a 50 per cent increase over production in 1946. Sufficient double-cross seed will be available in 1948 for a material increase in the acreage which may be planted to Louisiana hybrids.

Many problems are arising in producing and processing hybrid seed by mechanical methods. The major problem at the present time is the mechanical harvesting and husking of hybrid seed stocks. The tight husk necessary for Louisiana-adapted hybrids makes it quite difficult to mechanically husk these corns. More information is necessary on the adaptability of hybrids to mechanical harvesting and husking.—J. B. Holley.

Dairy Research

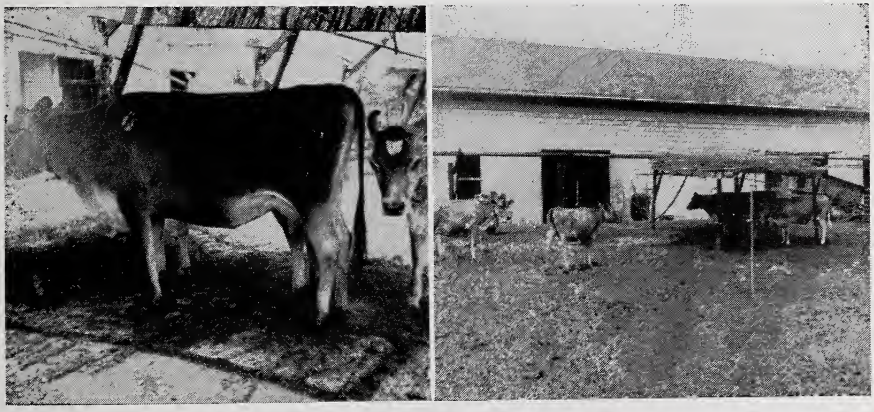
Sprinkling Cows Gives Promising Results

Body temperatures and respiration rates of cows were markedly lowered by use of a mist-like spray served free-choice style to cows in the shade. This occurred in an experiment conducted during late August and early September of 1947 when air temperatures in the shade taken at 11 a. m. averaged 90.7° F. and relative humidity 58.8 per cent.

Previous trials had demonstrated that the wetting of cows with water tended to cool them; however, it had been noted that the conventional hose nozzle produced a spray so coarse as to discourage cows from using it. In the present experiment several extremely fine mist-producing nozzles were attached to a water pipe suspended from the ceiling of a bamboo-constructed shade. The conditions produced proved to be especially inviting to milking Jersey cows, with a trend in this direction also for yearling Jersey heifers.

Comparative records kept on body temperatures of the 4 milk cows showed averages of 104.08° F. when in the sun, 101.91° F. when in the shade, and 100.76° F. when using shade with sprinkling device. Respiration rates averaged 112.9, 85.2, and 56.7 times per minute, respectively, under these three conditions. The sprinkling device tended to lower body temperatures and respiration rates to levels considered approximately normal for cool weather.

Two yearling heifers when checked in this same experiment had



A self-serving mist-producing sprinkler is shown in operation. On left, cows are under sprinkler, which is suspended from ceiling of bamboo-constructed shelter. On right, one-half of cows are under sprinkler and one-half outside in the sunshine. Cows when using sprinkler, free-choice, had body temperatures and respiration rates approximating normal levels, as contrasted to high levels for those without use of sprinkler.

body temperatures averaging 102.99° F. in the sun, 102.18° F. when in the shade, and 101.82° F. when allowed to use the shade with sprinkler. Respiration rates showed a similar trend with averages of 110.4, 86.7, and 64 under these respective conditions. In general, the heifers made use of the spray less than did the cows, apparently not feeling as much need for its cooling effect.

Future experiments are being planned to test how much effect the cooling derived from this spray may have on preventing the midsummer slump in milk production.—D. M. Seath and G. D. Miller.

Cows Cooled by Artificial Rain and Wind

An experiment was conducted which produced valuable information on how rain and wind as produced by nature tend to cool milking cows during summer months. The results also suggest the possible benefits from using mechanical sprayers and fans during summer when nature is not producing wind or rain.

When the experimental cows were removed from sunshine, sprinkled with water, and then subjected to a gentle breeze produced by a fan, they showed rapid changes toward normal body temperature and respiration rate. Shade alone showed some change in that direction, while the fan alone or sprinkling without a fan were intermediate in their effects.

In the experiment 6 grade Jersey milking cows were tied outside in the sun during 12 warm summer days between 12:00 noon and 2:00 P. M. Checks were then made concerning their body temperatures and respiration rates. Following this 3 of the cows were completely wet with water by use of a hand sprayer. All 6 cows were then removed to the barn. On one-half of the days the fan was then run to produce a breeze. Checks were made over a one-hour period to secure evidence concerning the effects of the various treatments. In brief the results follow:

	Body temp. (°*F.*)	*Respiration rate* (*per. min.*)
Actual average after in sun 2 hrs.	103.49	109
Change from above after 1 hour:		
Shade alone	-0.7	-21
Shade plus sprinkling	-1.26	-32
Shade plus fan	-1.39	-37
Shade plus sprinkling plus fan	-1.84	-35

—D. M. Seath and G. D. Miller.

Bull Semen Can Be Shipped Successfully

Recent studies at L. S. U. showed that bull semen for artificial breeding can be shipped successfully if it is delivered within 24 hours. Although the quality of some of the shipped semen was found to be

slightly lower than that of similar samples stored in the refrigerator, it was of a quality usually satisfactory for use in routine breeding. It is possible that better results would have been obtained if a low uniform temperature had been maintained for all samples while in transit.

Semen collected for use in this experiment was first examined, then diluted and cooled gradually to 40° F. Each collection was divided into three parts. One portion was stored at 40° F., one was shipped by parcel post, and the other was placed in an automobile for 24 hours to simulate shipment. The shipped samples were put in small tubes wrapped in paper towels and placed alongside a can or balloon of ice. The ice container and the tube of semen were wrapped tightly in a "Jiffy" bag and packaged in an insulated cardboard box for shipment.

All tests used in this study showed that the average quality of stored semen was better than the average for the shipped samples. However, some of the shipped semen was equal in quality to that of the stored. The average temperature of shipped semen after 24 hours was 49° F., with a range of 36 to 76° F. It was concluded that the slight reduction in the quality of shipped semen was caused by a combination of factors, including the lack of a low uniform temperature and agitation in transit.—T. E. Patrick and D. M. Seath.

Delayed Cooling and Diluting Lowered Semen Quality

Tests conducted during 1946-47 with semen collected periodically from 6 bulls gave valuable evidence that in artificial breeding it is important that the diluting and the start of the cooling processes take place immediately after semen is collected. When this was done the semen quality was better than when cooling was delayed or when both cooling and diluting procedures were delayed.

In the course of the experiment 42 ejaculations were used. Each ejaculation was divided into 3 parts and treated so that portion No. 1 was diluted and the cooling started immediately, the No. 2 was diluted immediately but cooling delayed for 45 minutes, and the No. 3 had both the dilution and the cooling processes delayed for 45 minutes.

Motility ratings of the semen samples 24 hours after storage in a refrigerator at 40° F. resulted in No. 1 averaging 3.13, No. 2, 3.11, and No. 3, 2.96. In these ratings from 0 to 5, evaluations were based on the percentage of active "motile" spermatozoa, and a rating of 2 indicates that approximately 50 per cent of the spermatozoa show motility, while that of 5 would be for those with all spermatozoa in motion, with other ratings following this trend. At the end of 72 hours the ratings were 2.20, 2.02, and 1.18 for the three respective procedures. Other tests made on the semen including the incubation test and the methylene blue reduction tests also showed the same trend. Results of the experiment

emphasized the importance of having the laboratory located near where semen is collected. When this is done the diluting and cooling procedures can start immediately; thus one source of lowering semen quality is eliminated.—H. W. Anderson* and D. M. Seath.

Should Pastures Be Fertilized Yearly?

Yields of milk from cows grazing on improved permanent pasture on the B. P. Alford farm near Mt. Hermon in 1947 totaled 3,068 pounds per acre, with a value in excess of costs for supplemental feeds and fertilizers of $95.22 per acre. This record, however, was not as high as that recorded in 1946, when the milk yield per acre averaged 5,229 pounds. It appeared that the fertilization program followed may have been mostly responsible for the differences in yield found, for phosphate and potash fertilizers were last applied in the fall of 1945, thus giving a larger boost to yields in 1946 than for 1947. Results secured for previous years had shown this same trend. In view of this, it would appear that an annual fertilization program would prove profitable when the relative levels of fertilizer, feed, and milk prices are in line with those now existing.—D. M. Seath.

Calf Starters to Save Milk Are Tested

Calf feeding trials with Holsteins and Jerseys showed that Holstein calves could be grown successfully on a dry grain calf starter when taken off whole milk at 28 days of age. The calf starter consisted of soybean meal, yellow corn, wheat bran, oats, bone meal, salt, and shark liver oil supplemented with approximately 5 per cent nonfat dry milk, or meat scrap or fish meal. Good quality hay and the calf starter were fed after the first week.

All calves showed a drop in growth rate and some had scours between the fourth and sixth weeks but made good gains thereafter. The Holstein calves made better gains during the "slump" period than the Jerseys. The Jersey calves consumed less than 100 pounds of milk and the Holsteins less than 150 pounds for the 28-day milk period. At the end of 16 weeks there was no difference in total gain of the calves between those receiving skim milk powder and those getting fish meal or meat scrap proteins in the calf starter.

—L. L. Rusoff and C. W. Burns.**

Oats vs. Corn in Dairy Ration

Oats compared favorably in feeding value with corn or a combination of corn and oats in concentrate rations for milking cows. This was shown in an experiment involving 18 cows conducted over a pe-

*Assistant Extension Dairyman, Louisiana Agricultural Extension Service.

**Graduate student on fellowship furnished by J. T. Gibbons & Co., New Orleans.

riod of 84 days. In this test each of three concentrate rations was fed to each cow for a period of 28 days during the experiment. The order of receiving the three rations varied from cow to cow so as to help balance possible carryover effects. Ration A consisted of 300 pounds of ground corn and 100 pounds of cottonseed meal; ration B, 300 pounds of ground oats and 100 pounds of cottonseed meal; and ration C, 150 pounds of ground corn, 150 pounds of ground oats and 100 pounds of cottonseed meal. Each of the three mixtures also contained 1½ per cent salt, 1 per cent bone meal, and 1 per cent oyster shell flour.

The test concentrate mixtures were fed at the rate of 0.4 pound for each pound of milk produced in excess of 13 pounds for Holsteins, and 0.6 pound for each pound of milk produced in excess of 8 pounds for Jerseys. The cows were also fed corn silage at the rate of 3 per cent of live weight and hay at the rate of 1 per cent of live weight daily.

Average production of 4 per cent equivalent milk for all rations was 25.2 pounds per cow daily, with only minor variations (less than 2 per cent) between yields on the three rations. These variations were insignificant in size and can be explained by chance variation.

Results of the experiment give indications that oats can replace most if not all of the corn in a dairy ration with little effect on its value. Louisiana dairymen may in the future utilize this information in planning for the production of more oats as a dairy feed. Even now, it is evident that the steady increase in the acreage of oats reflects the general knowledge that much of the Louisiana land will produce more feed nutrients at less unit cost when devoted to oats rather than corn.

—D. M. Seath and Paul Henderson.*

*Mr. Henderson is herdsman for the Department of Dairying.

Entomology

Cotton Insect Studies

Several Organic Chemicals Show Promise as Cotton Insect Poisons

The results of extensive observations and experiments conducted during 1947 showed that the several synthetic organic chemicals used in the cotton insect control studies are extremely toxic to one or more of the several major cotton insects. It was also demonstrated that with the advent of these new poisons, the control of cotton insects has become more complicated. These new materials are not only very specific in action against injurious insects but, in general, kill many beneficial species. Damaging infestations of bollworm, aphids or red spiders, or a combination of two or three species, may follow the use of these poisons in boll weevil control programs.

A brief summary of the indicated insecticidal values of the various chemicals and one mixture used in cotton insect control investigations follows:

DDT is effective against the bollworm, cotton fleahopper, tarnished and rapid plant bugs and thrips. It is relatively ineffective against the boll weevil, and applications may be followed by severe cotton aphid and red spider infestations.

Benzene hexachloride is effective against the boll weevil, cotton aphid, cotton fleahopper, tarnished and rapid plant bugs, leafworm, thrips, southern green stinkbug, garden webworm and fall armyworm. Applications of benzene hexachloride usually cause increased infestations of bollworms and red spiders.

Chlorinated camphene is effective against the boll weevil, bollworm, cotton fleahopper, tarnished and rapid plant bugs, thrips, leafworm and southern green stinkbug. In some cases, aphids have increased where several applications have been used; and it will not control heavy aphid infestations. Applications of chlorinated camphene usually cause increased infestations of red spider.

Chlordane has shown promise against certain cotton insects, but additional research is needed before it can be accurately evaluated as a cotton insect poison. The results of limited tests indicate that a mixture containing at least 10 per cent of chlordane will be required to control the boll weevil and cotton aphid. In some instances, applications of chlordane were followed by increased bollworm and red spider infestations.

Parathion, "3422," used in limited tests was very effective against cotton aphids and red spiders, and relatively ineffective against boll-

worms and boll weevil at 2 per cent concentration under field conditions. This chemical (0,0-Diethyl-0-p-Nitrophenyl Thiophosphate) is highly poisonous to warm blooded animals and, in some cases, causes headaches, nausea, weakness and other discomforts to persons exposed to it for relatively short periods.

3-5-40 Mixture (3 per cent gamma benzene hexachloride, 5 per cent DDT, and 40 per cent sulphur) has been highly effective against all of the major cotton insects when applied at rates of 10 to 15 pounds per acre per application at 4 to 5-day intervals, under favorable weather conditions.

Sulphur, 40 per cent or more, as an admixture with either DDT, benzene hexachloride, chlorinated camphene or chlordane, inhibited the build-up of red spiders.

—L. D. Newsom, John S. Roussel, and C. E. Smith.

Seedling Cotton Was Seriously Damaged by Insects During Spring of 1947

Observations and studies of insects on seedling cotton during the spring of 1947 showed that injury, which amounted to serious damage in many instances, occurred generally throughout most of the cotton growing areas of the state. The injury consisted of the malformation or destruction of the young leaves and growing buds. This caused excess branching and, in some cases, killed the plants, leaving poor stands. (See accompanying photographs.)

In some places the effects of the early insect attacks, or else the infestations of at least one species which continued for some time, prevented the setting of fruit until the branches were six or more inches long. This delayed fruiting apparently was a major factor in resultant decreased yields, which also was probably aggravated by droughts that followed. The indications were that aphids and thrips were the principal offending species, with the latter being largely responsible.

—L. D. Newsom, John S. Roussel, and C. E. Smith.

Left, young cotton plant recovering from early thrips and aphid injury; right, cotton plant multi-branched, resulting from thrips and aphid injury in seedling stage.

Cotton Fleahopper Was Unusually Destructive to Cotton in 1947

The cotton fleahopper has been recognized as a cotton pest, occurring periodically in localized areas, for about 20 years. It has occurred most frequently in destructive outbreaks in the Red River Valley. In 1947, it caused considerable damage in the parishes of the Delta section in the northeast corner of the state, as well as in the Shreveport area. In some cases, the insects appeared to migrate from cotton to croton and from croton back to cotton, thus prolonging the period of infestation.—L. D. Newsom, John S. Roussel, and C. E. Smith.

Sugarcane Insect Control

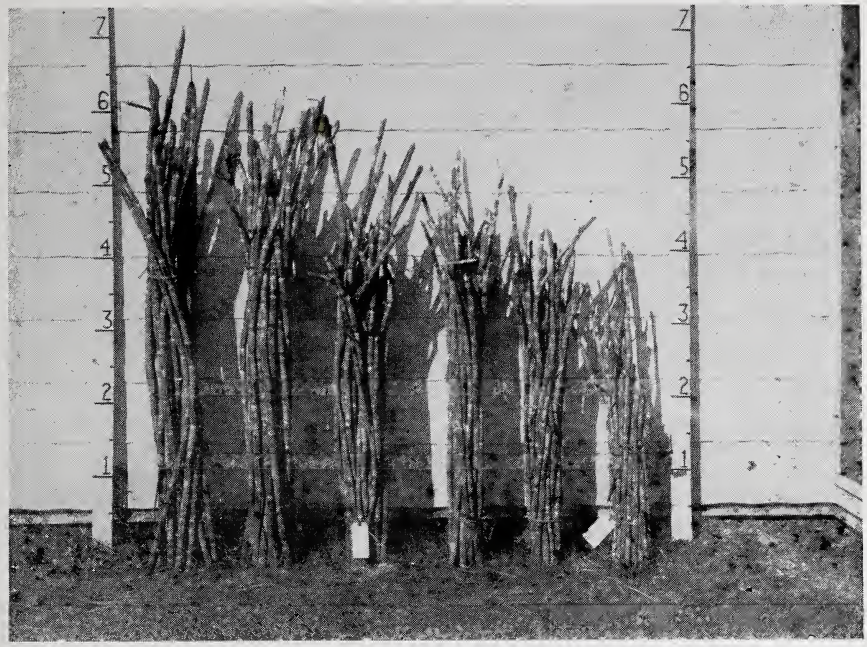
Cryolite Remains the Most Satisfactory Insecticide for Sugarcane Borer Control; Ryania Shows Great Promise

In 1947, the results of 20 field-plot experiments and numerous practical field comparisons revealed that cryolite produced the most effective control of the sugarcane borer, and that Ryania showed much promise. Benzene hexachloride, chlorinated camphene, parathion, and chlordane accounted for significant increases in borer infestations following second generation dusting, due apparently to their injurious effect upon the natural enemies of this pest.

Against first generation borers, these organics, with the exception of chlordane, compared favorably with undiluted cryolite in small-plot experiments. In large-scale airplane applications, cryolite proved to be slightly superior to chlorinated camphene. No significant increases in borer infestation occurred by harvesttime in either the cryolite or chlorinated camphene treated areas.

In tests for control of second generation borers, benzene hexachloride, chlorinated camphene, parathion and chlordane either gave very little control or were actually responsible for significant increases in borer infestations and losses in yields of cane and sugar. At one location, chlordane, benzene hexachloride, parathion and chlorinated camphene accounted for losses in yields of cane of 6.65, 4.88, 2.87, and 2.72 tons per acre, respectively, while cryolite, 50 per cent Ryania, and 50 per cent sodium fluosilicate produced increases in yields of 2.33, 4.42 and 1.29 tons. All of the first mentioned materials effected near perfect control of the yellow sugarcane aphid. In five different tests, cryolite accounted for increases in yield of cane of 2.33, 4.93, 6.15, 7.95, and 4.66 tons per acre, and increases in sugar yields of 1,120 to as much as 2,284 pounds per acre. A study of various concentrations of benzene hexachloride and chlorinated camphene indicated that the lowest and the highest concentrations were more effective than those in between.

The results of second generation airplane tests, in which cryolite, benzene hexachloride, and chlorinated camphene were compared,



Samples of cane showing the effect of different levels of borer infestation as measured by per cent joints bored. Reading from left to right: No injury; 0-15 per cent; 16-30 per cent; 31-45 per cent; 46-60 per cent; 60 per cent and over.

indicated that the drift of the organic dusts into the cryolite plots may have reduced the amount of control obtained from the cryolite. The initial borer control was about the same for all treatments; however, a tremendous increase in infestation occurred in the benzene hexachloride and chlorinated camphene plots by harvesttime.

Against fall generations of borers in summer-planted cane, the results were somewhat similar to those against first generation, except that chlorinated camphene fell much below the other treatments in effectiveness.

The results of a borer injury study to determine losses in weight of cane, sucrose, yield of sugar, length of stalk, and number of joints resulting from different levels of borer infestation are illustrated in the accompanying photograph.—A. L. Dugas, C. E. Smith, E. J. Concienne.

Velvetbean Caterpillar

The velvetbean caterpillar was less abundant and destructive in 1947 than it had been in several years. Observations indicated that this insect appeared two weeks or more later in the fields in south Louisiana than usual, which was probably influenced by the cool, late

spring. Severe outbreaks did occur in limited areas in south Louisiana, but the infestations were relatively light, though general, in the seed producing areas in central and northern parts of the state.

Results of control experiments and observations had indicated that cryolite was not nearly as effective against large worms as against newly hatched ones. The results this year substantiated that fact. Against a heavy population of full grown larvae, considerable differences in control were obtained from cryolite, undiluted; DDT, 5 per cent; parathion, 5 per cent; chlorinated camphene, 10 per cent; and benzene hexachloride, 3 per cent gamma isomer. On the first and fifth day after the insecticidal applications, the following controls were obtained: cryolite, 34 and 50 per cent; DDT, 82 and 95 per cent; parathion, 98 and 97 per cent; chorinated camphene, 92 and 94 per cent; benzene hexachloride, 88 and 97 per cent, respectively. Chlordane and sodium fluosilicate gave very little control even after five days, whereas 50 per cent Ryania accounted for a 69 per cent control.

Parathion, as low as 1 per cent concentration, killed practically all insect life in a soybean field. More than 75 different species of insects were killed the first day, many of which were important predators and parasites.—A. L. Dugas, C. E. Smith, and E. J. Concienne.

Truck Crop Insect Studies

Oil-Pyrethrum Remains the Best Treatment for Corn Earworm Control in Sweet Corn

Experiments in 1947 comparing several of the new insecticides with oil-pyrethrum for the control of the corn earworm in sweet corn showed that none of these new materials compared favorably with the oil treatment when applied once to the maturing ear. Toxaphene, DDT and "3422" gave significant controls over check plots; however, the oil-pyrethrum treatment gave a control that was significant over all other treatments and checks. Untreated plots contained only 18 per cent of the ears free of worm injury, whereas, the oil-pyrethrum treatment gave 74 per cent of the ears free of injury. The degree of control secured by the other insecticides ranged between that on the untreated plots and that on the oil-pyrethrum plots.—E. H. Floyd and C. E. Smith.

Timing of Applications Important Factor in Tomato Fruitworm Control

An experiment in 1947 showed that insecticidal applications for the control of the tomato fruitworm should be carefully timed and continued until maturity of the first fruit. This study involved the use of cryolite applied at various stages of development of the plant and con-

tinued at weekly intervals for from one application to a total of five applications.

The results secured from this experiment indicate that it is not worthwhile to apply an insecticide to tomatoes before the fruit begins to set. The best time to start insecticidal treatments, according to this experiment, is when the fruit reaches marble size, and best results were secured when the treatments were continued at weekly intervals until the first fruit reached maturity. Plots receiving treatments that were discontinued before maturity of the first fruit had significantly more wormy fruit than those plots where the treatments were continued until the first fruit matured.—E. H. Floyd and C. E. Smith.

New Insecticides Proving Detrimental to Cucurbits

It was hoped that the new insecticides appearing in the agricultural field would solve the cucurbit insect problems. However, tests have shown that most of these more promising insecticides can not be used on cucurbits. Benzene hexachloride burns the foliage of cucumbers as well as retards the growth. Both toxaphene and DDT have shown definite injury to squash. Toxaphene causes severe foliage burning, while DDT results in a stunting of plant growth and a complete failure by the plant to set fruit. This last fact is in all probability due to the destruction of pollinating insects necessary for the proper setting of fruit.—E. H. Floyd and C. E. Smith.

2,4-D Unsafe on Sweet Potatoes When Used as a Preharvest Treatment to Kill Vines

Following up experiments conducted in 1945 and 1946 in which various weed killers were used to destroy sweet potato vines as a means of controlling the sweet potato weevil, the work in 1947 consisted of comparing concentrate sprays of the butyl ester of 2,4-D in both water and fuel oil to an equivalent amount of the chemical when used in a dilute water spray.

All plots treated with the concentrate sprays failed to produce more than a 10 per cent mortality of the vines. The dilute spray resulted in approximately a 75 per cent mortality. All treatments with the exception of one where the vines were cut just previous to the application resulted in approximately 50 per cent breakdown of the potatoes at digging time. Those plots where the vines were cut before the 2,4-D was applied showed only 2 per cent of the potatoes decayed. Even though the concentrate spray failed to do little more than wilt the vines, the degree of injury to the potatoes was practically the same as where the dilute spray was used.

The use of a 2,4-D treatment as a preharvest method of vine killing as a means of sweet potato weevil control is too hazardous to consider.

—C. E. Smith and E. H. Floyd.

Benzene Hexachloride Controls Insects on Summer Corn But Renders Product Unfit for Table Use

Experiments begun several years ago in the search for an insecticide that would make possible the production of summer-planted sweet corn in Louisiana were continued in 1947. Results in 1946 indicated that benzene hexachloride had possibilities in this field. As a result of the work in 1946, a field experiment was set up in the late summer of 1947, using benzene hexachloride at different intervals of treatments. The variety of corn in the test was Golden Bantam Cross. The summer of 1947 proved a very disappointing year to attempt to grow corn due to the unusual drought. However, in spite of the dry season, those plots treated with benzene hexachloride at weekly intervals reached approximately 75 per cent normal size, were relatively free of insects, and produced a limited crop of ears. Plots treated less often were severely damaged by insects and failed to produce ears. Untreated plots in the same field were completely destroyed by insects within three weeks after planting. It was the opinion of all who saw this experiment that those plots treated at weekly intervals would have produced a normal yield of corn for this variety had the season been more suitable.

Summer-planted sweet corn—Treated with benzene hexachloride in background, untreated in foreground (totally destroyed by insects).

The disappointing fact is that the corn produced had absorbed the obnoxious odor of the benzene hexachloride, which became more pronounced when the corn was cooked.—E. H. Floyd.

Outlook for Recommendations for Control of Wireworms In Near Future Bright*

The character of the experiments which in the past were designed to discover a practical control measure for wireworms has been reversed. The past experimental program was along the lines of development of a suitable long-range crop rotation system along with controlled planting dates that would serve to "starve" the worms from infested farms.

*In cooperation with Tom Wimberly, Ringgold; Harris Cason, Plain Dealing, and J. B. Kirklin, Rocky Mount.

Efforts to effect control through the use of chemicals have long since been abandoned, and the adaptation of a long-range, complicated crop rotation system does not fit into the small, hill country cotton-corn farm program.

With the appearance of new insecticides in the field, interest in chemical control has been revived. Experiments located at several widely scattered wireworm infested areas in North Louisiana were conducted in 1947 in which several of these new materials were used as a soil poison previous to planting as a means of killing the worms in the soil before damage could be done.

To date, with but one year's results, it is too early to make positive statements; however, it can be said that several of the chemicals used showed very good promise of giving control, and one, benzene hexachloride, even when used at extremely low dosages, gave complete protection in every case. One experiment in 1947 on a second planting of corn (the first having been 100 per cent destroyed by the wireworms) gave the following yield results; untreated areas, 2 bushels per acre; average of treated areas, 28 bushels per acre.

Several questions, however, must be answered before this material can be safely recommended for general use. Among these are: (1) What effect could the chemical have on the flavor of plant products? (2) Are all anticipated crops for this area tolerant to the chemical in the soil? (3) What is the minimum dosage necessary to give control? (4) The best method and time to treat the soil? Attempts to answer these questions will govern the type of tests to be conducted in 1948.

—E. H. Floyd and C. E. Smith.

Left, soil treated for wireworms in background, untreated in foreground. Right, representative yield of corn from wireworm experimental control plots; untreated on left, treated on right.

Laboratory Studies With Hexaethyl Tetraphosphate

This new insecticide has recently received considerable attention, especially as an aphicide, since very good control of several species can be secured at extremely low concentrations of the material in water. The material is also reported to hydrolyze rapidly after being dissolved in water. Hydrolysis, if too rapid, would necessitate the immediate use of the spray after preparation. On the other hand, rapid and complete hydrolysis of the chemical would eliminate any poisonous residue remaining on the plants to be consumed by humans.

Laboratory biological studies were conducted to determine at what point the prepared insecticide began to hydrolyze and the length of time required for complete hydrolysis. It was found that under normal laboratory conditions the insecticide began to show deterioration biologically eight hours after preparation and that toxicity gradually decreased until the solution was neutral in biological toxicity tests when forty hours old.

Two facts are evident from this study: (1) the necessity for the immediate use of the prepared spray, and (2) that forty hours after preparation the toxic principle has disappeared from the spray solution.

—E. H. Floyd.

Fertilizer and Feedstuffs Laboratory

Activities of the Laboratory

The primary function of the laboratory is to perform analysis of official samples of feedstuffs, fertilizers, and insecticides submitted by inspectors of the State Department of Agriculture. The analyses are carried out according to the procedures of the Association of Official Agricultural Chemists. The analyses are reported to the Commissioner of Agriculture and serve as a basis for the enforcement of laws pertaining to the sale and distribution of these materials.

During the past year about 1,200 samples of feedstuffs, 800 samples of fertilizers, and 50 samples of insecticides, representing at least one sample from each brand sold in the state, were analyzed. The analyses revealed shortages in some samples of feedstuffs and fertilizers. The consumer is advised to consult the Feedstuffs and Fertilizers Bulletins of the State Department of Agriculture to see which manufacturers give full value in their products.

In addition to the official analyses, about 500 miscellaneous analyses were performed for other departments of the Experiment Station and for the people of the state. Materials such as feeds, fertilizers, insecticides, 2-4-D, water, limestone, peat, moss refuse, etc. were included in the miscellaneous work.

An average of one sample per week was examined in cases of suspected poisoning of livestock. Very few samples showed the presence of poison. Where poison was found, it was usually due to the carelessness of someone in leaving nitrate of soda, paint cans or paddles, or calcium arsenate where the animals could get to it. Presence of poisons in feeds purchased from reliable manufacturers is extremely rare.—E. A. Epps.

Home Economics Research

Nutrition Education

A research project was initiated in Ascension Parish in 1944 for the purpose of determining effective methods for teaching nutrition in public schools. The project includes several studies, some of which were reported previously.[1] This report presents a summary of a three-year food habits study and a comparison of dental conditions in 1945 and 1947.

Food Habits—Surveys of food habits were made during the first week of December each year. Survey findings gave information as to what kinds of changes in diets were needed and what diet changes were being made. Both kinds of information were regarded as essential to an effective nutrition education program. The annual food habits survey is a specific evaluation procedure developed to appraise nutrition education within schools and communities. A description of that evaluation procedure has been prepared for classroom teachers especially and is soon to be published in bulletin form entitled "Appraising Food Habits."[2]

Data collected over the past three years show considerable improvement in food habits, yet the needs for specific dietary changes were approximately the same. Improvement here means an increased intake of protective foods—those which are rich sources of proteins and vitamins. According to Table I the food groups showing high levels of intake in 1944 were still high in 1945 and 1946. The food groups showing low levels of intake in 1944 were still low in 1945 and 1946.

While there was a marked change in the percentage of "good" food habits (See Table II) over a three-year period, it was not attributed to dramatic changes within the general food pattern but rather to an increased level of intake of the same foods. ("Good" food habits had a daily average of 14 or more servings of protective foods; "Fair" food habits had a daily average of 13-8 servings of protective foods and "Poor" food habits had a daily average of 7 or less servings of protective foods.)

Generally: (1) the intake of "meat" and "other vegetables" groups was adequate, (2) the intake of "milk," "eggs," "non-citrus fruit," and "potatoes" was approximately half of the amount needed; (3) the in-

---

1 See Annual Reports, Agricultural Experiment Station, Louisiana State University, 1944-45 and 1945-46.

2 To be published by L. S. U. Materials Bureau through a grant from the General Education Board.

take of "citrus fruits" was approximately one-third of the recommended amount; and (4) the intake of "whole grains," "butter (also margarine)," and "green leafy vegetables" was near one-fourth of the need.

The findings of the food habits survey were consistent with the laboratory findings reported by Gibbens et al.[3] They reported high levels of hemoglobin and protein for a group of high school girls representative of Ascension Parish. They also reported that a large percentage of the girls had low levels of ascorbic acid in the blood. It is not surprising to find high protein and hemoglobin values in the blood of high school girls who have had adequate intakes of lean meat as well as good (approximately 50-60 per cent of recommended standard) intakes of milk, eggs, and vegetable protein (peas and beans) for three years at least. Since food patterns are slow to change, it seems justifiable to suspect that the intake of meat, milk, eggs, and peas and beans was high previous to 1944 when the first food habits survey was made. Furthermore, it is interesting to note that more than half of these girls had low levels of ascorbic acid (below .4 mg. per cent) in the blood, and that the food habits survey indicated low intakes of citrus fruit and green leafy vegetables. (See Table I.)

TABLE I. Percentage of various foods consumed by school children as compared with recommended dietary standards, Ascension Parish, Louisiana, December 1944, 1945 and 1946. (White only)

Food Groups	Per Cent of Need		
	1944	1945	1946
Milk	46	53	56
Eggs	50	59	67
Fruit (non citrus)	57	76	77
Fruit (citrus)	35	39	55
Meat (lean only)	109	118	135
Whole grains	29	48	77
Butter (also Margarine)	23	33	33
Potatoes (Irish and Sweet)	57	69	87
Green Leafy Vegetables	19	31	36
Other Vegetables	110	113	147

TABLE II. Percentage rating of food habits of children in Ascension Parish, Louisiana, by schools, December 1944, 1945 and 1946. (White only)

School	Good			Fair			Poor		
	1944	1945	1946	1944	1945	1946	1944	1945	1946
St. Amant	.5	22.4	22.3	49.8	70.3	67.5	49.7	7.3	10.2
Dutchtown	2.0	24.0	25.8	61.4	71.4	69.3	36.6	4.6	4.9
Donaldsonville	2.3	.8	19.9	56.5	65.4	69.7	41.2	33.8	10.4
Gonzales	1.8	5.8	17.9	57.7	66.9	71.8	40.5	27.3	10.3
Galvez	.0	9.1	31.5	66.7	71.2	66.3	33.3	19.7	2.2
TOTAL	1.5	11.7	21.4	57.0	68.4	69.6	41.5	19.9	9.0

[3] See Annual Report, Agricultural Experiment Station, Louisiana State University, 1945-46, page 5.

Dental Conditions—Dental conditions as determined within limits described previously[4] have not improved appreciably. A comparison of dental surveys made in 1945 and 1947 is given in Table III. The most significant single figures were those indicative of conditions of "six year molars," since they are permanent.

The fact that the percentage of childern with apparently carious teeth was reported as higher in 1947 than in 1945 may be due to more careful observation by teachers, since they have made many inspections in the interim. Actually, the incidence of dental caries is probably

Table III. Dental conditions of children in Ascension Parish Schools, 1945 and 1947.

Dental Conditions	1945	1947
Percentage of Children with:		
All Sound Teeth	4	3
Carious Teeth	96	97
Carious Teeth Filled	22	27
Carious Teeth Not Filled	78	79
Six Year Molars Sound	27	24
Six Year Molars Filled	22	22
Six Year Molars Not Filled	45	48
Six Year Molars Extracted	18	18

higher than reported here. School records showed that considerable dental corrections had been made in the past two years. A summary of their records, given in Table III, indicates an increase of five in the percentage of children with "carious teeth filled."

No new studies have been made this year. Studies still in progress are: (1) An Appraisal of Ways of Teaching Nutrition in High Schools; (2) The Development of School-Community Action on Problems of Nutrition and Health Through Representative Teachers Committees; (3) Food Habits in Ascension Parish, and (4) An Appraisal of Dental Conditions in Ascension Parish. A full report of all studies within this project is being prepared.—Floyd Eugenia Whitehead.

Nutritional Status of Louisiana People of Various Age Groups

This report concerns phase 1, which is on the determination of the nutritional status of pre-adolescent and adolescent school children in Louisiana with regard to blood levels of carotene, vitamin A, calcium, phosphorus, hemoglobin, erythrocytes, and leukocytes.

This work was begun September 15, 1947. The needed laboratory equipment was ordered and set up. Chemicals were acquired and

[4] See Annual Report, Agricultural Experiment Station, Louisiana State University, 1944-45, page 69.

prepared for use, and the spectrophotometer and other instruments standardized for determinations to be made.

The blood levels of calcium, phosphorus, hemoglobin, erythrocytes and leukocytes, and leukocyte differentials on 22 boys and 24 girls between the ages of 9 and 11 were determined. This group included subjects with and without abnormal skin manifestations.

These pre-adolescents were a part of the subjects of a large study being made jointly by the Louisiana State Department of Health and Tulane School of Medicine. Their records of the physical and nutritional status of these Louisiana school children were made available. The dietary records of these subjects were kept and are being analyzed.

The same determinations plus the plasma levels of vitamin A and carotene were made for a group of Louisiana State University Home Economics seniors. The ages of this group ranged from 20 to 24 years.

—Dorothy S. Moschette and Cecelia Pudelkewicz.

Horticultural Research

Irish Potato Breeding

In 1943 the DeSoto and LaSalle varieties were released. This year a third variety, the LaSoda, is being introduced. This seedling was formerly known as L-36, bred by the Louisiana Station. A brief description of this variety follows.

The LaSoda is a cross between the Triumph and Katahdin and was first grown in the fall of 1936. The plant is of medium vigor and very upright with medium to small leaves. It blooms more freely than the Triumph, and the flowers are purple. The tubers are semi-round to slightly oblong, similar to those of the Katahdin. The color is a very bright pinkish red and the skin is very smooth. The eyes are medium in depth to very shallow. This variety is early to medium early. While it shows some resistance to mosaic it is not in any way immune.

Table 1 gives the yields of the three Louisiana varieties as compared with the Triumph as a standard. It will be noted in every instance that each of the three new varieties significantly outyielded the Triumph and that northern and Louisiana fall-grown seed significantly outyielded Louisiana spring-grown seed.

TABLE 1. Yield (bushels per acre of marketable potatoes) and source of seed test of 3 new Louisiana Irish potatoes

Variety	Source of Seed			
	Louisiana Spring	Northern	Louisiana Fall	Variety[1] Average
Triumph	87	163	152	134.0
DeSoto	115	224	205	181.3
LaSoda	96	254	189	179.7
LaSalle	121	216	223	186.7
Source of Seed Ave.[2]	104.8	214.3	192.3	----

[1] Difference necessary for significance—23.20 bus.
[2] Difference necessary for significance—20.08 bus.

The LaSoda produces higher yields than the Triumph and the potato has a bright red velvet appearance which appeals to the consumer so much that this variety when placed on the market has sold at 15 to 25 cents per hundred premium over other varieties. This fact alone cannot be overlooked. These varieties like all others must be grown in various areas and if they perform as well in other areas as they have in Louisiana they will continue to be increased. Four seed potato producing areas are now increasing these varieties for distribution, and a limited amount of seed is now available.—JULIAN C. MILLER.

The Use of Sprout Inhibitor on Irish Potatoes

There is considerable interest in the use of sprout inhibitor, methyl 1-naphthaleneacetate on Irish potatoes to be stored for food. It was believed that this material might be beneficial for keeping potatoes in better condition in common storage during the summer in the deep South. Preliminary tests with potatoes of the Triumph and Katahdin varieties for one season showed that sprout inhibitor when used in liquid form was more effective than when used in dust form. Potatoes were treated June 7 and examined September 10. All of the control, or untreated potatoes, were sprouting at the latter date, while more than half of those treated with dust and less than one-fourth of those that received the liquid treatment were sprouting. Neither treatment had effectively prevented sprouting by November.—W. D. Kimbrough.

Sweet Potato Breeding

In the past it has been necessary to use many seedlings and varieties of sweet potatoes in the breeding nursery to provide all of the desirable characters necessary for the development of a superior variety of sweet potato. For the past several years much emphasis has been placed on combining these desirable characters into a few seedlings which could be used as parental material and thereby reducing the number of different kinds of material in the nursery. A great deal of progress has been made along this line and now it is possible to concentrate on only a small number of parental lines which possess most of the desired characters.

Approximately 4,000 seedlings were grown from true seed during the past year. From this planting, 54 seedlings were considered worthy of further trials. Promising seedlings which had been saved from previous years' plantings were increased and additional data taken. Several selections have proved superior to the standard variety, Unit I Porto Rico, in one or more desirable characters, and these have been increased or used as parental material in the breeding program. Thirteen of these promising sorts will be tested for yield and adaptability in the main sweet potato districts next year. All of these are table stock seedlings and two are resistant to Fusarium wilt and soil rot. This is the first time resistance to these diseases has been combined in table stock seedlings.

Cooking tests were conducted on 23 promising seedlings, with Unit I Porto Rico used as the standard. Eighteen of the seedlings had a better flesh color than Porto Rico. Two to four proved to be equal to or better than Porto Rico in quality.—John J. Mikell and Julian C. Miller.

The Effect of Exposure to Sun on Keeping of Sweet Potatoes

The recommendation is often made that sweet potatoes should not be exposed to the sun after they have been dug. To obtain some information on this subject, sweet potatoes that were dug in August, September, and October were exposed to the sun for varying lengths of time. The weather conditions the past season were ideal for the experiment, as hot, dry weather prevailed generally. It was found that exposure of freshly dug sweet potatoes to bright sun for one hour did not in any instance result in any damage. Exposure for three hours caused slight injury when temperatures were high. Exposure for six or more hours always caused considerable damage to the potatoes dug in August and September. There was no appreciable damage from even the longest exposure used, which was one week, to potatoes dug in October. Damage from exposure was observed at first as shrivelling of the upper surface. This condition was followed rapidly by a decomposition of the root which on casual observation seemed similar to black rot.—C. K. Miller and W. D. Kimbrough.

Effect of Seed Treatment of Sweet Potatoes on Sprout Production

One of the most serious diseases of sweet potatoes in Louisiana is black rot. One important factor in the control of this disease is the treatment of potatoes that are to be bedded for sprout production. Some growers hesitate to treat their potatoes because some of the recommended treatments may delay sprout production. An experiment was run to determine the effect of treatments with Spergon, Semesan Bel, mercuric chloride and hot water on sprout production. Certified Porto Rico potatoes were used. One lot was bedded in the greenhouse and another in the field. There was some stimulation of early sprout production in Spergon treated lots compared with those that were untreated. Mercuric chloride, borax and Semesan Bel treatments retarded early sprout production. The hot water treatment was very promising from the standpoint of early sprout production in the greenhouse. In the field, however, practically all of the roots that had received the hot water treatment rotted. The hot water treatment was a rather severe one, and the outer part of the roots seemed to be partially cooked. Under favorable conditions in the greenhouse the roots treated with hot water were able to produce sprouts satisfactorily. Very unfavorable weather followed bedding in the field, and under those conditions the roots injured by the hot water treatment rotted.

—C. C. Singletary and W. D. Kimbrough.

Some Effects of Harvesting Methods and Container Preference on Keeping Quality of Louisiana Peaches

This represents the results of a two-year study on problems relative to harvesting and packaging Louisiana tree-ripened peaches for market. Investigations as to the source of bruising indicate that actual picking operations are responsible for roughly 25 to 30 per cent of the total bruises, while moving the packaged fruit to market accounts for another 16 per cent.

A large portion of the work conducted in 1947 was concerned in determining the relative efficiency of ten different containers as possible carriers for tree-ripened peaches. In order to simplify total evaluation of the containers, seven judgment factors, each worth ten points, were applied to the various carriers, with the summarized score presented in Table 2. The factors used in evaluating the containers were: amount of bruising in transit, rate of cooling, keeping ability, strength of container, general appearance of container when packed, ease of handling, and cost. According to the total scores, the tomato lug and the Sparten boxes gave the best over-all performance, while the Friday pack and hat box scored the lowest. The low score of the hat box is no doubt due

TABLE 2. Container performance on the basis of judgment scores of seven essential factors

Containers	Bruises in transit	Rate of cooling	Keeping ability	Container strength	Container appearance	Ease of handling	Container cost	Total
Standard Bu.	5	7	7	9	7	8	10	53
Vent. Bu.	1	8	6	6	8	8	10	47
½ Standard Bu.	3	8	9	8	8	7	8	51
½ Vent Bu.	4	9	8	8	8	7	8	52
½ Sparten	8	10	8	9	9	10	7	59
1 Sparten	8	10	7	7	8	9	8	57
96 Cell	9	4	9	5	10	4	9	50
Friday Pack	6	5	8	4	6	5	7	41
Tomato Lug	9	10	8	10	6	10	8	61
Hat Box	8	8	7	10	5	2	6	46

to its poor handling and packing qualities. For similar reasons the 96-cell box rated second place as a container. The bushel containers did not attain superiority largely because they failed to prevent excessive bruising of the fruit while in transit. The tomato lug scored well on all points, but at the present time neither the growers nor the wholesalers are prepared to pack or accept storage shipments of peaches in these containers. However, the performance of this container indicates favorable potentialities and probably with some improvement it could come into general use. The results obtained in 1946 and 1947 serve to point

out several defects in the bushel-type baskets as containers for moving tree-ripened peaches to market. It is a negative approach to the problems, but in view of the low rating accorded the bushel type of baskets on bruises, it is suggested that the ½ Sparten box and the 96-cell box be given preference.—D. C. ALDERMAN.

Vegetable Seed Increase Work

The work in 1947 was largely devoted to increasing, by Louisiana growers, new varieties of vegetables bred by the Louisiana Agricultural Experiment Station. New varieties of vegetables bred by the Experiment Station are becoming increasingly important in the state's agriculture as a result of the program of assisting farmers in increasing seed of these varieties. During the year, assistance was given seed and plant growers in the production and selling of 606,145 pounds of improved seed, 20,650,000 plants and 8,200 bushels of seed potatoes. These were produced by 80 Louisiana growers and the Louisiana State penitentiary under the specialist's supervision.

The specialist also helped distribute approximately 175,000 Marion Bell strawberry plants which were grown under our supervision.

The following table presents a summary of seeds and plants produced in 1944, 1945, 1946 and 1947.

Item	Quantity 1944	Quantity 1945	Quantity 1946	Quantity 1947
Collards—Louisiana Sweet (lbs.)	1,050	3,200	1,600	1,100
Corn—Louisiana Bayou (lbs.)	2,100	3,900	14,000	2,000
Corn—U. S. D. A. (lbs.)	16,800	20,100	------	------
Okra—Green Velvet (lbs.)	17,700	50,000	65,000	100,000
Okra—Louisiana Market (lbs.)	------	200	500	400
Cabbage—Allyear (lbs.)	300	250	350	400
Onion—C-5 Creole (lbs.)	1,450	3,600	4,600	800
Onions—White and Other (lbs.)	------	3,000	300	450
Shallots—Louisiana Pearl (lbs.)	2,100	300,000	310,000	500,000
Watermelon—Dixie Queen (lbs.)	300	200	175	300
Strawberry Plants—Konvoy, Klonmore, Marion Bell and Klondyke (plants)	325,000	222,000	350,000	475,000
Onion Plants—C-5 Creole	------	400,000	250,000	175,000
Sweet Potato—Unit 1 (bus.)	7,000	5,800	13,000	8,000
Sweet Potato—New Seedlings (bus.)	------	500	800	200
Sweet Potato Plants	------	------	20,000,000	20,000,000
Pepper—Dixie Wonder (lbs.)	------	12	250	150
Pumpkin—Longfellow (lbs.)	------	25	75	125
Peppers—Tabasco, Cayenne, Sport (lbs.)	------	------	------	420

Tomato Breeding

In addition to the breeding program at the Louisiana Experiment Station, yield and observational trials were conducted in cooperation with the U. S. Regional Vegetable Breeding Laboratory. STEP* 10, 14 and 24 showed promise and will be tested again in 1948. STEP 29 is resistant to Cladosporium.

Louisiana 6-1-1 gave the best results at Baton Rouge. During the hot, dry weather in the early fall, 6-1-1 was the only tomato which was able to set any fruit. This seedling has been tested for many years with leading varieties and seedlings and in all cases has proved to set fruit better under hot, dry conditions than any lot tested. Louisiana 6-1-1 is now being increased and will be released when the seed supply becomes adequate.

Flowers from many varieties were treated with a commercial plant hormone during the hot, dry weather of August to induce growth and development of the fruit. Most of the lots developed fruit satisfactorily.

—John J. Mikell and Julian C. Miller.

---

*STEP—Lot numbers given by the U. S. Regional Vegetable Breeding Laboratory.

Plant Pathology

Cotton and 2,4-D

The commercial application of 2,4-D dust to control rice weeds and water hyacinths resulted in injury to cotton in nearby fields in certain parts of the state. The reports of injury were so numerous that fields of injured cotton were observed throughout the growing season and experimental studies were started in order to be able to answer certain pressing questions. The severity of the injury depended upon the size of the plants, their vigor, and the amount of 2,4-D they received. Injured plants produced malformed leaves, flowers, bolls and swellings on the stems. The leaf injury varied from a slight pebbling of the surface to extremely modified leaves less than a half inch wide, with prominent veins, extra long lobes and ruffled margins. Usually, injured cotton plants recovered and started to produce normal leaves and flowers in from 3 to 6 weeks. This delay in development is serious as the plants then produced squares and bolls in a period of maximum boll weevil infestation. Injuries were most serious when the cotton was dusted with 2,4-D after the formation of squares through the blooming stages. Studies indicated that reductions in yield up to 60 per cent occurred with plants injured at this stage of development. Much of the injury resulted from

Effect of 2,4-D on leaves and flowers of cotton.

the failure of the users to realize the potency of this herbicide, together with careless and haphazard application. In the future these 2,4-D herbicides will probably be used in much greater quantities than at present. The user of 2,4-D must recognize the dangers involved and use all precautions to avoid injury to adjoining crops.

—Clair A. Brown, Q. L. Holdeman, and E. S. Hagood.

Alligator Weed Control in Sugarcane

Experiments in 1946 showed that one application of 2,4-D of the proper strength not only killed the surface growth of alligator weed in sugarcane fields but also destroyed a large portion of the roots. Likewise one application in a growing season seemed to be sufficient for excellent control of this weed.

2,4-D compounds were applied by compressed air sprayers, airplanes, high velocity air sprayer-duster combinations and low velocity dusters. Airplane applications were quick, cheap and under some conditions quite effective. However, after the sugarcane plants were 2 to 4 feet tall the leaves prevented too much of the herbicide from reaching the weeds on the ground, and the effectiveness of the treatment was reduced especially where the lower concentrations of 2,4-D were used. The results obtained with the high velocity sprayer-duster were not satisfactory, in that a uniform coverage was not obtained and there was an excessive drift of the spray and the dust. Low velocity dusters with the row outlets close to the ground gave satisfactory results, but their use must be restricted to areas where sensitive crops are not present.

Any volume of spray solution from 6 quarts to 100 gallons per acre can be used and satisfactory results can be obtained if the proper amount of 2,4-D is used. The function of the water is to facilitate the even distribution of such small amounts. The low solubility of the sodium salt, however, necessitates the use of 10 to 15 gallons of spray solution per acre. The lower volumes require finer nozzles and better strainers to reduce clogging. Low volumes tend to drift because of the fine atomization. Some may prefer to use volumes of 25 to 30 gallons per acre, as there will be less drift and, in case of operating difficulties, less wastage of solutions.

Under some conditions better killing of a variety of plants has been obtained with 2,4-D in diesel oil or tractor fuel. The 2-4-D—oil sprays, however, injured sugarcane so much that it should not be used as a blanket spray, though it has a place for killing weeds in ditches.

—Clair A. Brown, Q. L. Holdeman and E. S. Hagood.

Controlling Rice Weeds With 2,4-D

Weeds in rice fields take a large toll each year in Louisiana and have become more important in recent years when labor has not been

available for hand pulling. While proper flooding of rice normally controls most weeds and grasses, in many instances it is not sufficient. Hand pulling and mowing are used to remove indigo and curly indigo, but this is not practical for the Mexican weed (birdeye) and red weed. Tests made in 1946 with 2,4-D indicated that this chemical would control the broad-leaved weeds at a relatively low cost per acre. Considerable acreage was treated in 1947 with moderately good results considering how little was known in regard to how the material should be used. 2,4-D when applied as a dust resulted, in certain cases, in severe injury to cotton and certain other crops from drift. The 1947 tests were designed to evaluate sprays in relation to dosage, time of application, injury to rice, and drift. Results showed that sprays are safer than dusts and when properly applied will control the broad-leaved weeds. Increases in yield of 3 to 5 barrels per acre were obtained where weed infestation was heavy and the soil fertility was moderate to high. The cost of treatment was $2.50 to $3.50 per acre for material and for application.—T. C. Ryker.

Water Hyacinth and 2,4-D

It is estimated that the water hyacinth blankets some half million acres of Louisiana's streams, lakes and marshlands. This plant impedes navigation and drainage, interferes with hunting and fishing, and causes annual losses estimated at over 14 million dollars.

Early in 1945, small test plots of water hyacinth in the University Lake were sprayed with 2,4-D compounds. An unusually good kill of this pest resulted from the application of small amounts of the chemical. The results were far superior to those obtained with the other herbicides available at the time. However, eradication was not complete, and the studies were continued. The results in 1946 showed eradication was dependent upon securing a complete coverage of the plants in the area with the 2,4-D spray. At times, this was difficult because of the rank growth of the plant. The results, however, were so good that when citizens of Baton Rouge asked the University to "kill or remove the lillies," a systematic spray program was started.

Technical assistance was furnished to Mr. Steele Burden, who supervised the spraying. After the work was started, the Department of Wild Life and Fisheries also placed a crew on the lake for a few days.

Last March, when the systematic spraying was started, there were over 50 acres of this beautiful pest in the University Lake. Today, just a few survivors are scattered around the margin of the lake, an excellent demonstration of the effectiveness of 2,4-D. The hyacinths were killed at a cost below any other method of removal and this was accomplished without injury to the ornamentals around the lake.

—Clair A. Brown, Q. L. Holdeman, and E. S. Hagood.

Controlling Alligator Weed in Rice Irrigation Canals

Many rice irrigation canals have become badly infested with alligator weed, *Alternanthera philoxeroides*. This weed not only necessitates the use of considerable hand labor to keep the canals open but seriously threatens the rice industry when it grows out over canal banks and infests rice fields. Rice fields are also endangered from plant parts being carried into fields with irrigation water. The application of 2,4-D to alligator weed growing in flooded canals usually merely kills the plants back to the water level and does not prevent regrowth. In tests in 1947, 2,4-D, applied in the spring 15 and 30 days prior to flooding of canals controlled this weed to such an extent that there was very little growth in treated areas even at the end of the season. This indicates the possibility of eradication by repeated applications of the chemical.—T. C. Ryker.

Sugarcane Root Rot and Antibiosis

The amount of loss caused by root rot in sugarcane is difficult to evaluate but is probably much greater than is realized. Heavy soils in particular show considerable root rot. Usually vigorous root rot resistant varieties do well in the Western part of the sugar belt. Among the factors which determine the amount of root rot in a soil, the microflora probably plays a considerable part. A study was initiated in 1946 to attempt to analyze the role of *Actinomyces* in the soil in reducing root rot. These studies have been carried on for two years. Tests of over 6,500 cultures from the sugar belt with respect to their antibiosis to the fungus *Pythium*, generally regarded as the major fungus responsible for root rot, are summarized in the following table. The average yields of C. P. 34/120 in the varietal test plots over the area are also

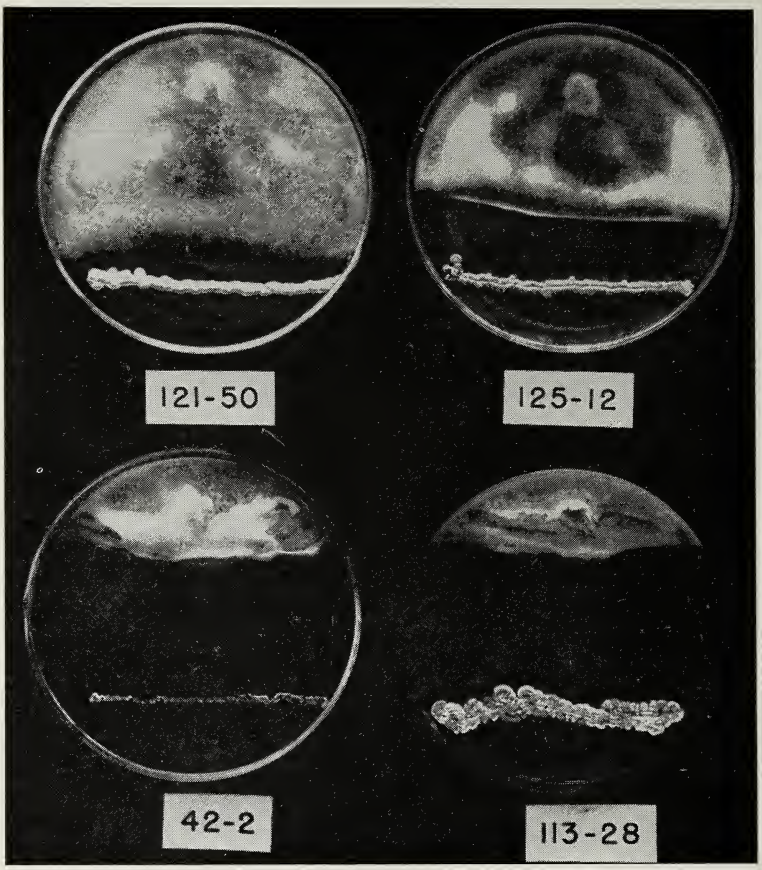
Yields of sugarcane and antibiotic value of sugarcane soils in Louisiana

Soil Area	Yields of C. P. 34/120		Actinomyces	
	No. Tests Averaged	5 yr. Average tons per acre [1]	No. Cultures Tested	Antibiotic value of soils [2]
Red River, Yahola	20	37.7	461	3,585,000
Miss. River and Lafourche (light)	53	31.9	2,271	3,108,000
Teche and Lafayette	56	26.0	1,712	2,144,000
Sharkey clays (heavy)	40	23.7	2,095	2,009,000

[1] Average of plant cane and 1st stubble of varietal tests of Dr. G. Arceneaux and Mr. C. B. Gouaux.

[2] Antibiotic value=Inhibition in millimeters in petri dishes × number of Actinomyces per gram of soil.

given. It may be seen that a high antibiosis to *Pythium* is correlated with high yields.—S. J. P. Chilton and W. E. Cooper.



Antibiotic effect of soil *Actinomyces* on a *Pythium* causing root rot of sugarcane. Top, weakly antibiotic strains; bottom, strongly antibiotic strains.

Red Rot Infection

The manner in which the fungus causing red rot of sugarcane gets into the sugarcane stalk has not been clear. In 1946, evidence was found which indicated that cane stalks which were apparently healthy carried the red rot fungus in a dormant condition and when these stalks were subjected to unfavorable conditions the fungus spread into the interior of the cane stalks. Additional studies made in 1947 confirmed these conclusions. Major centers of dormant infection were found to be leaf-scar tissue and bud scales. Infection could be traced from these tisues into the nodes and internodes of susceptible varieties. The amount of latent infection was correlated with the amount of red rot developing in the stalks. The determination of the amount of latent infection in a variety seems to offer another method of evaluating a new variety for its behavior with respect to red rot in the field.

—S. J. P. Chilton and R. J. Steib.

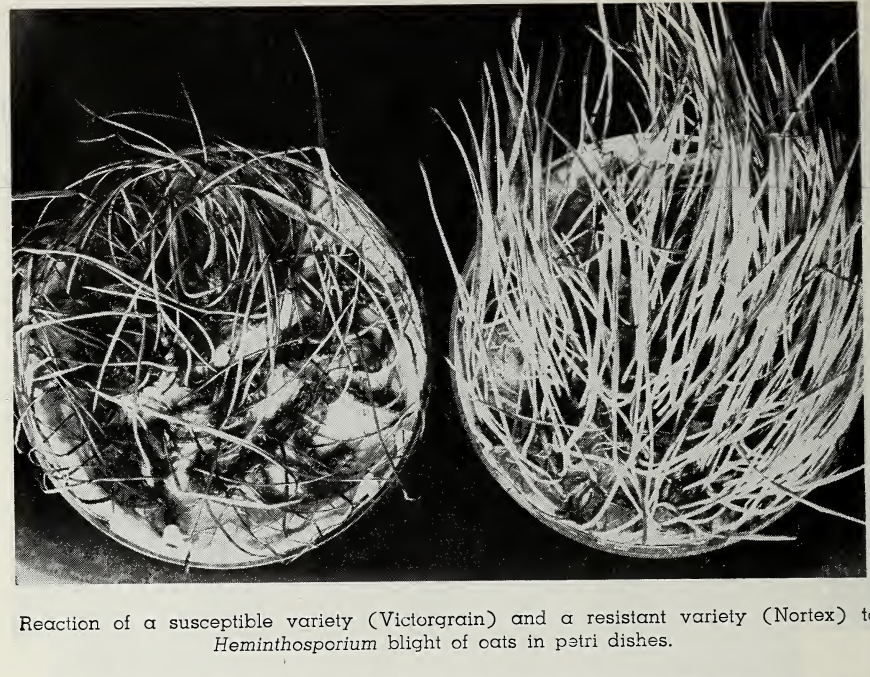
Stages in red rot infection through leaf scars of Co. 290 sugarcane.

Oat Varieties and the New Disease, Helminthosporium Blight

The new oat disease *Helminthosporium* blight, or Victoria blight, was first found in Louisiana in the spring of 1947. By harvesttime the disease had become very serious on many of the Victoria hybrids, including Victorgrain and Traveler. On many farms yields were reduced drastically. The disease is carried in and on the seed and is introduced on a farm by the use of infected seed. The serious potentialties of this disease were recognized and a mimeographed circular was immediately sent to all agricultural agents recommending a shift to resistant varieties. Many growers followed these recommendations with the result that the acreage planted in susceptible varieties was moderately reduced.

Tests have been made both in the field and in the greenhouse with a large number of varieties and selections to determine their resistance to this disease. On the basis of these tests the varieties grown in Louisiana or likely to be grown in this state may be grouped as follows: *Resistant*— Alber, Appler, Camellia, Clinton, Ferguson 922, La. 42-48, Nortex; *Intermediate but probably safe for planting*— Fulghum; *Susceptible and unsafe for planting*—Letoria, Quincy Red, Traveler, Victorgrain.

In preliminary tests, seed treatments with Ceresan using infected seed of susceptible varieties have not given satisfactory control of the disease.—J. G. Atkins and E. R. Stamper.

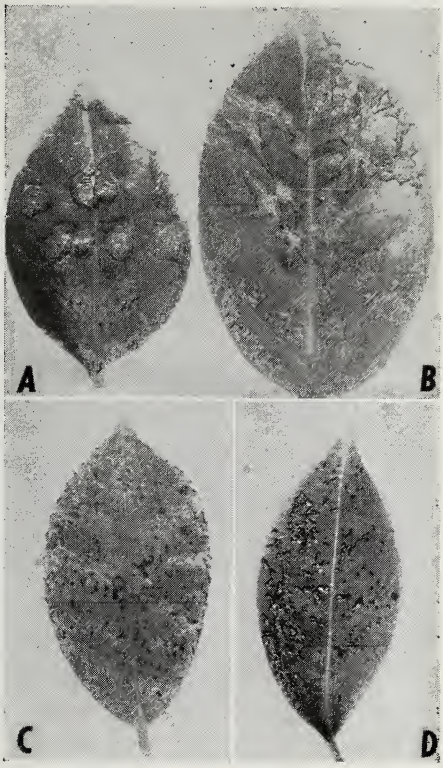


Reaction of a susceptible variety (Victorgrain) and a resistant variety (Nortex) to *Heminthosporium* blight of oats in petri dishes.

Reaction of oat varieties to *Helminthosporium* blight. Upper picture (left to right): Traveler, Victorgrain, Fulghum, Clinton, and Camellia. Lower picture (left to right): Traveler, Victorgrain, Fulgrain, Camellia, and Nortex.

Camellia Scab

Spots of various sizes, shapes, and colors occur on leaves of camellias in Louisiana. Most of them occur on the upper surface of the leaves and may be black, gray, brown, or white, smooth or rough and corky. A very rough, raised, corky, scabby kind of spot is often very prevalent on the under surface of the leaves of certain varieties (Pope Pius, Purple Dawn, Hovey and others). When numerous enough, these spots mar the appearance of camellia foliage and arouse apprehension on the part of nurserymen and camellia lovers in general.



Scab of camellia. A. Large, raised, round, concentric type of scab lesion on upper surface. B. Large, raised, angular type of lesion on upper surface. C. Black-spot type of lesion on upper surface. D. Raised, corky type of lesion on under surface.

A study was undertaken to determine the cause of this leaf-spotting and to find a possible method of control. A fungus, *Sphaceloma*, has been found associated with the disease and and has been repeatedly isolated from all the different types of spots, and it is safe to conclude that this is the cause of scab on camellias, since all known species of *Sphaceloma* are parasitic, causing scabs on a large number of plants. It has not been determined whether or not more than one species of the fungus is involved.

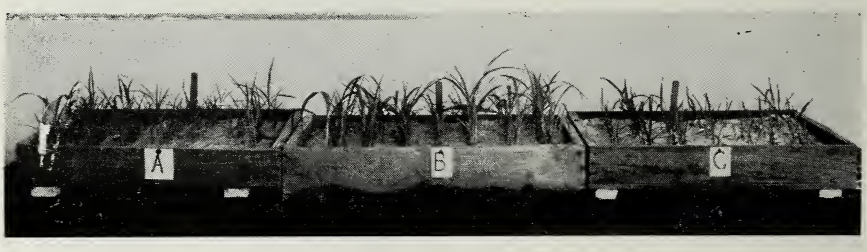
Limited infection has been secured by inoculating healthy camellias with pure cultures of the fungus.—A. G. Plakidas.

Johnson Grass Seed

In certain areas Johnson grass in sugarcane fields is one of the major problems of the sugarcane planter. On some plantations it has not been confined to the ditch banks but has spread into the cane fields, while in other places it has been kept in check. A knowledge of the amount of seed produced in the various regions of the sugar belt,

the viability of these seed and the possible effect of different soil types on germination, is important for the formulation of an intelligent control program. It has also been thought that Johnson grass seed did not germinate to any appreciable extent. Studies begun in 1947 have shown that seed which did not germinate under the usual method of testing in germinators would germinate well in the soil. Seed collected from over 20 places in the sugar belt germinated when planted in soil. Large differences were found in the per cent germination between seed collected in different places and at different times. Seed lots germinated in soil from all plantations in the sugar belt. As many as 3,000,000 germinable seed to the acre were found in the top 2.5 inches of soil in certain areas.

—S. J. P. Chilton, Ruth P. Phillips, and R. J. Steib.



Germination of Johnson grass seed in soil at Baton Rouge. Seed collected at (*A*) Billeaud, (*B*) St. Joseph, (C) Reserve.

Johnson Grass Control

Johnson grass is probably Louisiana's most important sugarcane weed. Where seedlings are not numerous this grass has been successfully reduced in fields by means of a fallow cultivation program. Even where seedlings are present in large amounts, fallow cultivation has been of considerable value. Yields of sugarcane in heavily infested lands vary from 11 to 15 tons per acre. Where these areas have been fallow cultivated as much as 22-25 tons of sugarcane have been produced. The cost of this program is from $12 to $25 an acre, and in addition one soil improvement crop is lost.

Once Johnson grass is reduced in a field, its elimination on ditchbanks and headlands is necessary to prevent reinfestation. Experimental studies and large-scale tests by several planters have shown that sodium chlorate in the form of Atlacide, when used at the rate of 600 pounds to the acre, killed the rhizomes of this grass. The treatment is expensive, however, and tests with other chemicals are in progress. Many growers will spray their ditchbanks with this chemical in 1948 because they realize that a fallow plowing program for success must also include the control of Johnson grass on the ditchbanks.

Where viable seed are present, their control is necessary in order to prevent the reinfestation of an area. Experiments now in progress

tend to show that pre-emergence applications of 2,4-D and certain other chemicals reduce seedling populations considerably. After emergence, seedlings have been killed with several compounds if treated when less than 2 inches high. Studies on this phase of Johnson grass control are being made to determine the efficiency of several chemicals recently made available for experimental use. Among these, ammonium trichloroacetate has shown promise both with seedlings and large plants.

—Clair A. Brown, T. C. Ryker, E. S. Hagood, and Q. L. Holdeman.

Effect of spraying ammonium trichloroacetate on Johnson grass. Center, untreated; left and right, treated.

Black Rot of Sweet Potatoes

In recent years, the washing of sweet potatoes before packing for shipment has become an established practice in Louisiana. However, the disease known as black rot has become very important with washed uncured, sweet potatoes and at times has caused serious losses to shippers.

A fungicidal dip treatment applied after washing the potatoes and effective in controlling black rot would be of considerable value to the sweet potato industry in Louisiana. In an attempt to find such a treatment, 21 chemicals were tested in many laboratory experiments to determine their effectiveness in controlling black rot. Borax gave the best results of all the chemicals tried. A momentary dip in a 1.0 to 1.25 per cent solution of borax gave excellent control of black rot with little or no apparent effect on the sweet potatoes. Dithane D 14 at con-

centrations below 1.0 per cent was less effective than borax and at higher concentrations caused a severe chemical burn on some lots of sweet potatoes. Dowicide A at concentrations up to 2.0 per cent was not as effective as borax, and severe chemical burn appeared in some tests.—W. J. Martin, L. H. Person, and E. O. Olson.

Effect of a 1.0 per cent borax solution on the development of black rot of sweet potatoes. Left, treated, right, untreated.

Soil Rot of Sweet Potatoes

The soil rot disease of sweet potatoes is a very serious disease in dry seasons, particularly in the St. Landry Parish area. Experiment Station tests over a period of years have shown that the application of 600 pounds of sulphur to the acre gives good control of this disease for 6 or more years. In 1947 a drouth at the beginning of the growing season made conditions quite favorable for the development of this disease. A survey of fields in the St. Landry Parish area showed that farmers who had treated their fields with sulphur as outlined in Louisiana Agricultural Experiment Station Bulletin No. 408 obtained normal growth of their potatoes and good yields.—W. J. Martin.

Internal Cork of Sweet Potatoes

Internal cork of sweet potatoes, a relatively new disease, characterized by the occurrence of brown, corky areas in the flesh of the potato, was observed for the first time in Louisiana in late 1946. Leaf symptoms, consisting of ring-spotting and vein-feathering, reported as being associated with internal cork, were observed to be widely scattered in sweet potato fields throughout the state during the 1947 growing season. However, little or no definite cork symptoms were observed in the potatoes at the time of harvest and in storage as late as December. Investigations are being made to determine the association of cork symptoms with the leaf symptoms and to determine the importance of this disease to the sweet potato industry in Louisiana.

—W. J. Martin and L. H. Person.

Late Blight of Irish Potatoes

In the past few years the late blight of Irish potatoes has become a serious problem in Louisiana. In the past, it has been generally assumed that for an epidemic to become established in Louisiana it would be necessary to bring in and plant diseased tubers. Consequently, a zero tolerance on seed potatoes has been maintained by the State Department of Agriculture for late blight as well as for ring rot, another serious disease of the potato which does not live over in this state. A rigid inspection of out-of-state seed potatoes has been made by the State Department of Agriculture cooperating with the Department of Plant Pathology to prevent the entrance of these two diseases into the state. In 1946 ten car lot shipments and in 1947 one car lot shipment of seed potatoes were rejected because of the presence of late blight in the potatoes.

In late 1946 and again in 1947 epidemics of late blight developed on the fall crop of Irish potatoes in southern Louisiana. The fall crop of potatoes is grown from seed potatoes obtained from the spring crop and stored through the summer. The epidemics of late blight on the fall crops of 1946 and 1947 indicate that the late blight fungus might have lived over the summer in some form in Louisiana. Previously, over-summering of the late blight fungus had not been observed. It seems likely that growers must pay more attention to spraying or dusting if they wish to keep the late blight under control.

—W. J. Martin, L. H. Person, and C. W. Edgerton.

Spraying and Dusting for Control of Onion Mildew

Another severe epidemic of onion mildew developed in the spring of 1947. At Baton Rouge the disease was especially destructive in onion-breeding stock. One field was so severely damaged that no seed was harvested. Bulb onions and shallots in the same field were badly injured by the disease also. One serious aftereffect of mildew on onions has been the rotting of the bulbs during the summer. Onion bulbs from an infected field were in bad condition at planting time, many of them having decayed and others having sprouted prematurely. Shallot sets from mildew infected plants also kept very poorly in storage.

Spraying and dusting failed to control mildew in bulb onions in the 1947 tests; however, a copper dust containing 7 per cent metallic copper and 2 per cent mineral oil with Bentonite as a carrier, reduced the amount of mildew in seed onions and shallots. A small plot of seed onions was divided into equal parts and one lot dusted with the copper dust seven times during April and early May. The disease was quite severe in the non-dusted plot, while in the dusted plot the plants stood up much better and gave a fair amount of seed. The yield of dry onion seed from the dusted plot was more than twice as large as that from the undusted area.—E. C. Tims.

Control of Root Knot Nematodes With Soil Fumigants

In certain soils of the state the root knot nematode causes considerable losses. In 1947, D-D mixture and Dowfume 40, which have shown possibilities in the control of this pest, were tested as soil fumigants for the control of the root knot nematode on fall-grown cucumbers on a commercial farm in the Hammond-Ponchatoula area. The two liquids were applied several days before planting, using a small tractor equipped to apply liquid soil fumigants. The strip method of application was used.

Both treatments were effective in reducing nematode infection of the cucumber roots, as shown either by the absence of galls or by the presence of only small galls as compared with roots from untreated rows. The treatments did not result in an increase in the aerial growth of the plants. Although it has been found that these two chemicals will effectively control root knot nematode infection and that one of them (D-D) is a relatively low cost material, their use has not as yet been shown to be an economical practice.—A. G. Plakidas and J. G. Atkins.

Dusts for Cucumber Disease Control

For many years spraying with Bordeaux was the standard practice with Louisiana farmers for the control of cucumber mildew. The two disadvantages of this method of control were the injury to cucumber plants by Bordeaux and the tedious labor necessary for its application. Tests made by the Agricultural Experiment Station in recent years have shown that copper dusts caused much less injury than Bordeaux and gave much better yields with greater ease of application. However, the copper dusts did not satisfactorily control anthracnose. In a search for better fungicides for the control of this disease it was found that a dust including Fermate gave good control of both mildew and anthracnose with no apparent injury to the cucumber plants. Tests in 1947 again showed Fermate dust to be superior to the copper dusts. In one field test where anthracnose was severe, cucumbers dusted with Fermate yielded 387 bushels to the acre while fields dusted with copper compound A gave only 93 bushels to the acre. A dust composed of 10 per cent Fermate, 20 per cent cryolite, 10 per cent Black Leaf ten, and 60 per cent filler has given good results in the control of mildew, anthracnose, and insects attacking cucumbers. Preliminary tests were made with the new fungicides Z-78, Zerlate, and Parzate. The results in 1947 indicated that they may prove to be as good as Fermate, and perhaps better.—J. G. Atkins.

Breeding Rice Varieties Resistant to Cercospora

The Cercospora leaf spot is one of the more important diseases of rice. The varieties of rice show varying resistance to the disease.

In the breeding work, one of the objectives has been to obtain varieties resistant to the disease. Such varieties have been obtained from time to time. The selection of new varieties, however, has been complicated by the sudden appearance of new parasitic races of the fungus. Up to 1947, eight races of the fungus had been recognized. Two more appeared in 1947. Shoemed, a variety used extensively in the rice improvement program and previously considered to be resistant to the leaf spot, was found to be diseased. This was due to a new strain of the fungus, Race 9. Another strain, Race 10, was identified on Blue Rose 41, Caloro, and Blue Rose. In spite of occurrence of these new races, progress has been made in the development of disease resistant varieties. Delrex and a number of selections from Blue Rose—Rexoro crosses have proved resistant to all of the known races of the fungus. These varieties are being increased for possible release.

—T. C. Ryker.

Seed Treatment of Rice

While reasonably good stands of rice are usually obtained when growing conditions are satisfactory, in years when temperatures are unseasonably low, stands in early plantings have often been poor. In some cases it has been necessary to replant. In Experiment Station tests, it has been found that stands have been materially improved when the seeds were treated with Arasan. Numerous large-scale field tests in 1947 gave substantial increases in stand, averaging 25 per cent. These tests were made with a dust material that was somewhat irritating to those treating the seed. This could be circumvented by the application of the material as a suspension or a slurry. A number of operators are procuring slurry machines for the treatment of seed rice. Since the cost of seed treatment is relatively small, 25 to 30 cents per acre, it seems desirable to include it as one of the standard cultural practices in rice growing.—T. C. Ryker.

Reduction of "Pecky" Rice With Fungicides

The presence of a considerable amount of discolored and shriveled grains of rice, usually known as "pecky" rice, has a tendency to lower the grade of a rice sample. Pecky rice is of particular importance in rice that is to be parboiled before milling. Past studies have shown the peckiness to be due to stink-bug injury and to microorganisms that enter through the feeding punctures of this insect and other defects in the grain. In order to determine the possibilities of a fungicide on reducing pecky rice, dusting experiments were made in 1947. Three applications of Parzate and tribasic copper dusts were made at heading. Dusted areas had about half as many pecky grains as undusted areas.—J. G. Atkins and T. C. Ryker.

Poultry Research

Proven Families in the Breeding Project

All poultry breeders are constantly seeking "superior germ plasm" in the form of proven sires and dams. When such individuals or combinations of individuals are found, the breeder can, through wise use of such stock, make rapid strides in his breeding program. During the 1947 season several good families were discovered in each of the four varieties produced at the project. The most outstanding record was that of a pen of 14 R. O. P. R. I. Red hens mated to a previously untried R. O. P. male. This male, No. 1840, was from a dam that laid 289 eggs. He made a particularly outstanding record as a sire, qualifying for Register of Merit (R. O. M.) Honor Roll with much to spare. Of his 82 daughters entered as R. O. P. candidates 60, or 73.2 per cent, qualified by averaging 245 eggs weighing 27.6 ounces per dozen. The 82 daughters averaged 216 eggs. Ten of his 14 mates qualified for R. O. M.; two of these made Honor Roll R. O. M.

The daughters of dam 130 and sire 1840 were the best individual family. Dam 130 laid 322 eggs, average weight 25.0 ounces per doz. Sixty-three chicks were hatched from 68 eggs set (92.6 per cent hatch). Of the 63 chicks hatched, 24 were sold, 12 others were cockerels, 11 were culled when young or lost their identity, and 16 pullets were housed as R. O. P. candidates. Thirteen of the 16 (81.3 per cent) qualified by averaging 252 eggs weighing 26.5 ounces per doz. The entire 16 averaged 231 eggs. This is the type of family the poultry breeder strives to produce.

When such stock is located through the progeny test it might be asked what use is made of it. Some use has already been made of the family described above. Twenty-four chicks from dam 130 and sire 1840 were sold to private poultrymen last year. Also a larger number of chicks from sire 1840 and his other mates were sold last season. More chicks from this stock will be for sale this spring. In certain matings an effort will be made to intensify and fix the good economic qualities of the above stock. Close in-breeding will be resorted to in some cases, but no chicks will be sold from the inbred matings. Chicks from these and other proven matings will be made available for distribution throughout Louisiana to further improve the poultry industry.

—B. A. Tower and C. W. Upp.

Abnormalities Prevent Sale of Breeding Stock

Certain morphological abnormalities have occurred rather frequently in potentially valuable breeding stock rendering it unfit for

THE BREEDING WORTH OF A SIRE AND DAM IS JUDGED BY THE PERFORMANCE OF THEIR OFFSPRING

SIRE 1840 DAM 130 (322 EGGS, EGG WT. 25.0, 92.6% HATCH)
SIXTEEN DAUGHTERS ENTERED IN R.O.P. - 13 QUALIFIED. SHOWN BELOW ARE 12 OF THE DAUGHTERS WITH INDIVIDUAL PRODUCTION AND EGG WEIGHT RECORDS

PROD.	238	273	235	262
EGG WT.	24.6	26.2	30.0	25.3

PROD.	221	272	280	210
EGG WT.	27.0	26.6	26.1	28.0

PROD.	272	272	253	213
EGG WT.	26.8	24.5	26.2	25.3

THE ABOVE SIRE AND DAM QUALIFY FOR R.O.M. HONOR ROLL

sale. A study has been undertaken to determine whether such characters are inherited and if so the mode of inheritance. Six breeding pens were mated last season to study three differnt abnormalities: (1) long lower mandible, (2) telescoped comb, and (3) "spike" comb, a condition in which the blade, normally flat and wide, is round and pointed. Eight hundred progeny were hatched and carefully observed periodically last year. Twelve pen matings are being tested this season, using selected individuals from the original matings and progeny from certain families. Preliminary data indicate the probable inheritance of these and other abnormalities but are too limited for positive conclusions to be drawn as yet.

—W. A. Johnson and C. W. Upp.

Two of the abnormalities being studied in poultry breeding stock. Left, long lower mandible; right, telescoped comb.

Is Winter Green Feed Worthwhile for Laying Hens?

Three comparable rations were used in paired pens, one with planted winter green feed (rye grass) grazed December through March, the other with no planted winter green feed. The value of the winter green feed crop is demonstrated by the following results. The hens with winter green feed averaged about 5 eggs more, worth 20 cents or more per hen. They did this on 5 to 8 pounds less feed per hen, or a saving of 19 to 32 cents per hen. Since 20 cents more value in eggs was produced and 19 to 32 cents was saved on feed, the winter green feed was worth 39 to 52 cents for each hen kept. Had the feed been purchased at retail prices the value would have been 45 to 60 cents per hen. Mortality and culling were higher in the pens without winter green feed.—B. A. Tower and C. W. Upp.

Finishing Broilers

Synthetic materials were included in finishing rations for broilers in four feeding trials. Birds fed 0.1 per cent thiouracil for two weeks gained 8 per cent more and consumed 10 per cent less feed per unit of gain than did the control lot. Carcass quality was improved markedly; 32 per cent more grade A (or better) birds were produced in the thiouracil (2 weeks) lot than in the control lot. The gains and feed efficiency were slightly below those of the control ration when thiouracil was fed for three weeks or four weeks, but 35 per cent more grade A (or better) dressed birds were produced by the thiouracil rations. An estrogenic substance, diethylstilbestrol, did not improve the ration when incorporated for a three-week period. Another estrogenic material, dienestrol diacetate, in one preliminary trial, gave results comparable to those of the two-week-thiouracil lot. These studies, substantiating those of last year, indicate that thiouracil when fed at the 0.1 per cent level in the ration will materially improve the rate of gain, the efficiency of feed utilization, and the market grade of the carcasses of broilers.—B. A. Tower, A. B. Watts, and C. W. Upp.

★ ★ ★

Rural Sociology

Parental Attitudes and Dental Care for Children in Rural Areas

Louisiana has a high incidence of unmet dental care needs among its rural children. These unmet needs appear to be neither entirely nor even largely due to inadequacies of professional personnel or to lack of financial resources. The partially completed analysis of pertinent data from two carefully selected survey areas in the state reveals that the attitudes of rural parents are of major importance in accounting for the discrepancy between the dental care children require and that which they actually receive. (See Figure 1.) Reasons given by adult informants for the neglect of dental care for children, though varying somewhat between the survey areas and the races, indicate that apathy on the part of rural parents as well as their lack of appreciation of the importance of such dental care is widespread and significant. It follows that any realistic program to raise the level of dental care for children in rural areas must, among other things, concern itself with these deep-seated determinative attitudes.

Verbal responses to questions relating to several important aspects

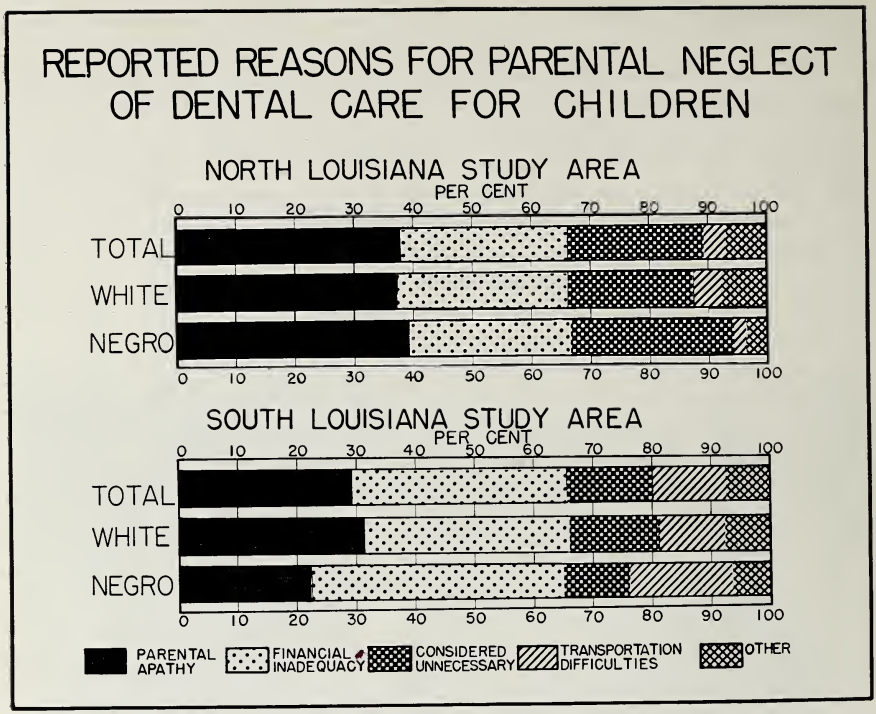


FIGURE 1.—Reasons reported for parental neglect of dental care for children in two rural survey areas of Louisiana in 1947, classified according to race of informants.

of dental care for children reflect the presence of attitudes and opinions which are at variance with those held and approved by members of the dental profession. Significant proportions of the parents report they believe that deciduous teeth are either less important than permanent teeth or of no consequence because they will be shed anyway; that a child suffers less with a toothache than an adult; that a child with a toothache is not a sick child; that a child with toothache presents few if any behavior problems; and that malocclusions result only in minor, if any, psychological handicaps. More than 30 per cent of the adult informants expressed an extreme fear of personal experience with the dentist, demonstrating that the vast store of humor emphasizing the popular dread of dental treatment is not without some basis in fact. Significantly, this expressed fear of the dentist among rural adults appears to vary little with age, sex, or race.

—ALVIN L. BERTRAND AND HOMER L. HITT.

Rural Health in Louisiana

The analysis of the relative position of rural Louisianians with respect to the availability and the utilization of medical services has

been continued. One important phase of this investigation shows that the percentage of live births without medical attention, though consistently higher among Negroes than whites, is largest for both races in the most rural areas of the state. (See Figure 2.) The presence of a population center of considerable size has the effect of reducing markedly the proportion of unattended births in the surrounding area. In 1945 in Orleans Parish less than 3.0 per cent of the births were reported as unattended by physicians; in the other parishes having centers of 10,000 or more population combined the figure amounted to slightly more than 1.5 per cent; but in the group of parishes having no urban center at all this proportion exceeded 30 per cent. For the state as a

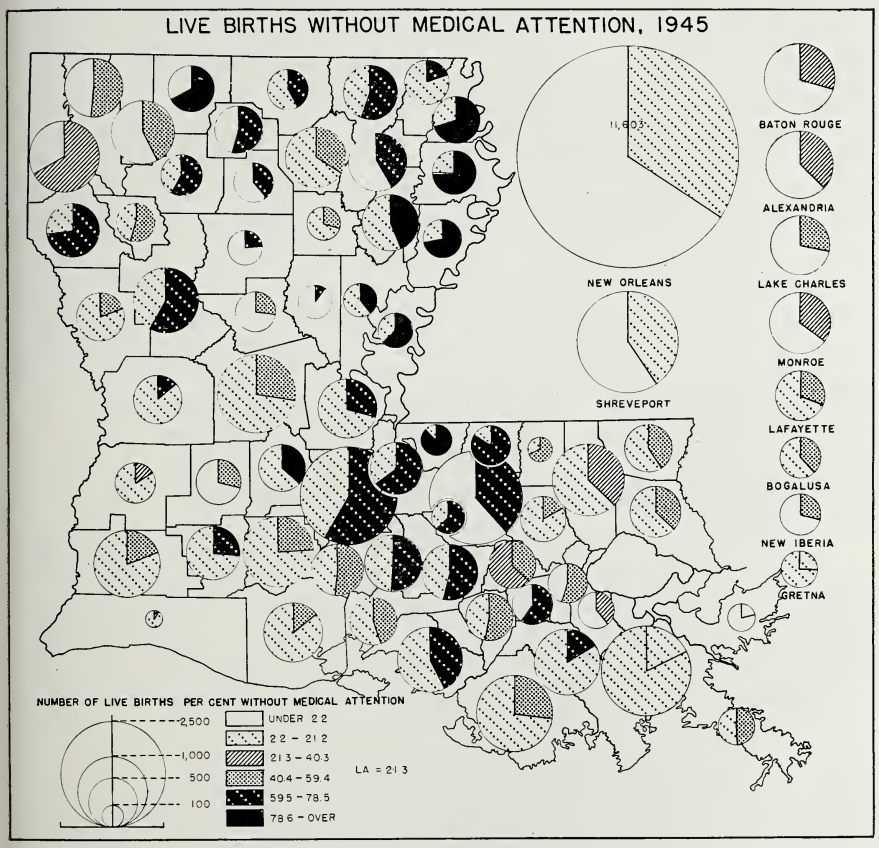


FIGURE 2. Number of live births and per cent without medical attention, classified by race and residence, Louisiana, 1945. (From a residential standpoint, data for cities of 10,000 or more inhabitants are shown separately and are not included in the parish totals represented on the map. Starting at 12 o'clock on the circle and reading clockwise the segments represent the nonwhite and white populations, respectively. Source of data: *Quarterly Bulletin*, State of Louisiana, Department of Health, Vol. XXXVI, Nos. 1, 2, 3, and 4, 1945.)

whole, slightly over one-fifth (21.3 per cent) of all live births were unattended by physicians. This pattern doubtlessly reflects the generally recognized tendency of medical doctors to concentrate in urban areas, thus providing the local and nearby residents with the greater opportunity for medical assistance.

Residents of the predominantly rural parishes also utilize state-supported hospital facilities to a considerably less extent than do the inhabitants of the more urban parishes. This is plainly demonstrated by a comparison of admission rates (number of admissions per 1,000 residents) to these institutions in 1946 from the parishes classified into the three broad groups according to the relative importance of their rural-farm population: (1) over 60 per cent of population rural-farm (2) 40 to 60 per cent of population rural-farm; and (3) less than 40 per cent of population rural-farm. Among whites the rates of admission to the so-called "charity" hospitals from these three groups were 18.0, 21.3, and 23.1, respectively. The corresponding figures among Negroes were 24.1, 44.7, and 83.3. These data indicate not only that an important residential differential exists for both races, but also that this differential places Negroes of the more rural parishes as compared with those of the more urban parishes at a much greater disadvantage than is the case for whites. This perhaps is due to the fact that distance from a hospital serves as a more formidable obstacle for the Negro. Although Negroes may be expected to gain admission to the tax-supported hospitals more frequently than whites, the actual extent of this racial difference, particularly in urban parishes, is impressive.

—Homer L. Hitt, Alvin L. Bertrand and Louise Kemp.

The Mechanization of Agriculture in Louisiana

A large series of tables, diagrams, and maps were prepared and studied to test the general hypothesis that the increase of motor power on farms (tractors, motorcars, etc.) was directly related to depopulation in rural areas. In general the results were all negative. In areas where tractors, motorcars, etc., increased greatly, there was heavy depopulation between 1940 and 1945; but the same was true generally. As a result it is reasonable to conclude that between 1940 and 1945 the flight of population from the land was motivated primarily by attractive forces in towns and cities in the South and in other areas, and not by forces propelling people from their homes on Louisiana farms. As a matter of fact, within this state during the five years under consideration mechanization probably was more of a response to, than a cause of, rural depopulation.—T. Lynn Smith.

Sugar Station

Varieties

The following new sugarcane varieties were sent to each of the eight Experiment Station test fields in the fall of 1947: C.P. Nos. 45-73, 45-92, 45-119, 45-122, 45-125, 45-137, 45-155, and 45-184.

Three new sugarcane varieties were released during the fall of 1947 for commercial cultivation: C.P. Nos. 34-92, C.P. 36-19, and C.P. 36-183. These are all considered to be at this time in the class of secondary sugarcanes. Each has desirable characteristics which indicate that it may be used to a limited extent in certain areas of the sugar district, and on certain soil types.

C.P. 34-92 because of its borderline sucrose content will probably find its place in the southern portion of the sugar district. We do not believe that it will become a variety of major importance throughout the entire sugar district. C.P. 36-19 has a satisfactory sucrose content but is not a heavy field yielder. It should be tried out on the most fertile soils of the alluvial Mississippi and Red River areas in comparison with the present commercial varieties now grown in those areas. C.P. 36-183 has many desirable characteristics, but it has a growth type which may greatly limit its usage. The variety has given good field yields, has shown a satisfactory sucrose content, and has been a good stubbler and a good growing variety under adverse conditions such as the drought of the past growing season. We believe that the variety should be extensively tried out, most particularly in the Mississippi River and Teche areas, on those soil types which are known not to produce the heaviest yields. Should the Industry be able to handle the harvesting of C.P. 36-183 satisfactorily, it may increase in importance in the sugarcane variety program.

Our seed cane increase program has been further strengthened by the establishment of a third Primary Increase Station on Orange Grove Plantation, New Iberia. The main purpose of that Station is to serve the Teche area. The three Primary Increase Stations—Smithfield, Southdown, and Orange Grove—are functioning properly through the cooperative efforts of the U. S. D. A. Station, Houma; the Sugar Station, L. S. U.; and the American Sugar Cane League. The Sugar Station sent a total of 41 new sugarcane varieties to the Smithfield Primary Increase Station during the fall of 1947; these were varieties of the C.P. 43, 44, 45, and 46 series. This Station also supplied part of the seed supply of new varieties necessary for setting up the Orange Grove Primary Increase Station; the Houma Station supplied the new station with seed cane, and the established Primary Stations on Smithfield and Southdown made their surplus seed cane available.

—E. C. Simon and F. W. Berthelot, Jr.

Test Field Work

A total of nine new sugarcane variety experimental fields were planted at the eight test field locations of the Louisiana Experiment Station. Eight of the fields are on Yazoo soil and one field on Sharkey soil. All plantings were made in the fall, from September 15 through October 8.

Main Plot Tests: An average of five commercial canes and eight promising unreleased varieties were planted at each test field.

Introductory Plots: The following eight new varieties were planted at the Cinclaire, Glenwood, Reserve, Meeker, Shirley, Caffery, Billeaud, and Youngsville test fields: C.P. Nos. 45-73, 45-92, 45-119, 45-122, 45-125, 45-137, 45-155, and 45-184. The small lots of seed cane of these eight new seedlings were grown at the L. S. U. Sugar Experiment Station, and were taken in cooperators' trucks to the test fields.

Season of 1947—The final results, consisting of field data and mill tests of cane varieties of 24 experimental fields, were obtained during the sugarcane grinding season from October 26 through December 20. The complete data and information on test field work conducted in 1947 is being prepared as a report under the title of "Sugarcane Test Fields—Season of 1947."

The season of 1947 was extremely unfavorable for sugarcane production in Louisiana. The very wet and cold month of March, the long summer drouth and the severe September 19 storm, were the principal causes for the marked reduction in field yields at all test fields.

For the past four years, C.P. 34-120, released for commercial planting in 1942, has been the top ranking variety. In 1947 it showed a comparatively low rating at most of the test fields, being injured more by adverse weather conditions of winter months than some other varieties.

Co. 290, another important commercial variety in the Teche and Western sections, behaved similarly to the C.P. 34-120, and ranked low at the Caffery, Billeaud and Youngsville test fields.

New Varieties—C.P. Nos. 44-101, 44-153, and 44-155 were the most promising of the lot of seven 1946 introductory varieties. Large plot plantings of these three varieties were made at the eight test fields. C.P. Nos. 43-3 and 43-9 gave very fine response during the past season. Most of the available seed cane of these two varieties was used for planting main plots in the 1947 fall plantings. C.P. 43-3 made an excellent showing at the Glenwood, Meeker and Youngsville test fields.

Some of the other unreleased varieties that showed promise at different test fields are as follows: C.P. Nos. 43-28, 43-32, 43-33, 43-47, 37-5, and 36-197.

1947 Results—(1) Red River Section: The averages on Yahola very fine sandy loam at the two test fields showed the following variety rankings: Meeker—(1) C.P. 36-105, (2) C.P. 36-13, (3) C.P. 36-183, (4) C.P. 34-120, (5) C.P. 36-19, and (6) C.P. 29-320; Shirley—(1) C.P. 36-105, (2) C.P. 34-120, (3) C.P. 29-320, and (4) C.P. 36-13.

(2) Upper Mississippi River Section: On Yazoo soil, the varieties ranked in the following order: (1) C.P. 36-105, (2) C.P. 29-120, (3) C.P. 36-13, (4) C.P. 29-320, and (5) C.P. 34-120. On Sharkey soil, C.P. 33-224, an unreleased variety, ranked first, followed in order by C.P. 36-105, C.P. 34-120, and C.P. 36-13.

(3) Lower Mississippi River Section: The average results on Yazoo soil at Glenwood and Reserve test fields indicate that the varieties ranked as follows: (1) C.P. 36-105, (2) C.P. 36-183, (3) C.P. 36-13, (4) C.P. 34-120, and (5) C.P. 29-120. Both locations showed exactly the same ranking of these five commercial canes.

(4) Teche Section: The averages on Baldwin clay loam, for fall plant cane, first and second stubble, show that C.P. 34-120 and C.P. 36-105 ranked first and second, respectively, repeating their performance of the season of 1946. Other varieties were in the following order: (3) C.P. 36-183, (4) F. 31-762, (5) C.P. 36-13, and (6) Co. 290.

(5) Western Section: On Lintonia soil at the Billeaud test field, averages of plant cane and first stubble showed the following variety rankings: (1) C.P. 36-105, (2) C.P. 36-13, (3) C.P. 36-183, (4) C.P. 33-310, (5) C.P. 34-120, (6) Co. 290 and (7) C.P. 29-116. Youngsville test field (Olivier soil): (1) C.P. 36-183, (2) F. 31-762, (3) C.P. 36-13, (4) C.P. 29-116, (5) C.P. 36-105, (6) C.P. 34-120, (7) Co. 290, and (8) C.P. 33-310.—C. B. Gouaux.

Veterinary Science

Anaplasmosis in Cattle

Anaplasmosis as reflected by cattle losses during the year was indicated to be less prevalent than in many previous years and the occurrence less extensive in the state. Most of it was limited to lower-lying areas where environmental conditions were suitable for the propagation of blood-sucking vector populations. Observations as to occurrence continue to indicate that blood-sucking flies (horseflies) are the principal natural vectors of the disease in Louisiana.

Continued comparative study of body tissue removed from acute and recovered "carrier" cases and from healthy animals has failed to enlarge upon the knowledge of the life cycle of the causative agent. That the causative agent is present in the red blood corpuscles of infected cattle has been well proved by injecting these blood elements into susceptible animals and thereby reproducing the disease. This refers to red corpuscles from an acute case or from a recovered carrier animal from which *Anaplasma marginale* may not be readily demonstrated. Other information as to development and localization of the agent in the animal body has not been clarified in controlled studies.

Efforts to develop procedures for making practical diagnosis of the disease in recovered animals, all of which may serve as reservoirs of infection, have been continued. During the year these have chiefly involved bio-chemical fractionation of blood from infected and non-infected cattle. Encouraging differences have been noted in the blood of infected animals as compared to non-infected animals, but some lack of specificity is evident. Results obtained appear to justify continued study of these methods.

—P. L. Piercy, R. H. Davis, and Anita Stone.

Gastro-Intestinal Parasites of Cattle

The experiments carried out during the past year have, to a large extent, been a continuation of the studies made last year on the life cycle of the hookworm attempting to follow the course of the infection. The experiments have demonstrated further that very severe symptoms and deaths can be produced by pure infection when larvae are placed on the skin. This further emphasizes the importance of barn and shade sanitation in the control program of this parasite.

It has been further demonstrated that the symptoms and deaths are caused during the larval period instead of during the adult life of the parasite. During the period of adult life of the parasite, as measured by the production of eggs, the calves improve in condition. This indicates that the improvement in general condition following the

administration of an anthelmintic is probably the result of the course of the life cycle of the parasite rather than of the elimination of the adult parasites; consequently sanitation should receive greater emphasis in the control program. Anthelmintics for the removal of the adult stages may be made use of to reduce the egg output and the consequent accumulation of the larvae which would serve as a source of reinfection and the infection of younger animals in the herd.

It has been definitely determined that the larvae pass through the lungs on their way from the skin to the intestine. This suggests that hookworm infection in calves may play a part in the occurrence of pneumonia even though no cases have developed in the experimental animals.

A limited number of preliminary experiments have been carried out in which a small amount of phenothiazine was added to the daily grain concentrate of calves infected with hookworms. The results indicate that the development of the hookworm larvae is prevented. Additional experimental work is necessary, however, before statements can be made as to the exact mechanism whereby phenothiazine is effective when administered continuously in small amounts.—Roy L. Mayhew.

Johne's Disease (Paratuberculosis)

During the past year one herd was brought to our attention which, from history obtained, has been having cases of this disease for ten years. Test of the herd revealed several reactors which were disposed of. Recommendations were made relative to raising of calves in hopes of avoiding early infection. The contour of the land and physical layout made this possible. Only time will tell the outcome. It was not possible through a study of the herd history to determine the source of the original infection.

Continued observation of a herd known to be infected since 1925 showed a decrease in clinical cases the past year and a half, though the total number of animals was not reduced. Post-mortem study of fatal clinical cases substantiated the test and clinical diagnosis. No significance can be attached to the lowered rate of clinical cases.

Comparative tests of different diagnostic agents (Johnin) in infected herds further substantiated previous observations that there are varying degrees of response produced by different products. One test designed to study duration of local desensitivity caused by Johnin was not successful as the animals did not respond to the Johnin used. Therefore at this time we again report that a spot of skin injected with Johnin is desensitized for at least 12 weeks and probably consideraby longer. This means that in retesting an animal, a new site of injection must be used if the lapsed time between tests is less than 4 months.

Herds having adult animals developing a recurrent diarrhea which

does not respond to treatment should be tested for Johne's disease. The veterinarian making the tests will study the results and the history of the herd and from this information make recommendations regarding the handling of the herd.—Ross M. Gray and W. T. Oglesby.

Typhoid-Pullorum Complex in Chickens

Investigations in connection with the Fowl typhoid-Pullorum complex were conducted along two separate methods of approach. One proceeded on a basis of developing a hypersensitivity test to differentiate Fowl typhoid and Pullorum disease clinically in the field, and the other to compose a medium in which the growth of the two organisms could be differentiated in the laboratory.

Twelve strains of *Salmonella gallinarum* and 2 strains of *Salmonella pullorum* were grown on various compositions of media to develop allergic products which could be injected intradermally into the wattles of chickens and show a positive reaction, manifested by a swelling, for the specific disease. Uninoculated media were given the same treatment and injected as controls. A completely satisfactory agent has not been developed, but the data obtained give definite promise that further experimentation is advisable.

In the laboratory experiments a large number of media were compiled in regard to the specific biochemical requirements of the *Salmonella gallinarum* organisms, containing an inhibitory substance for *Salmonella pullorum* and a dye indicator to determine utilization of carbohydrates. One medium was developed which gave particularly good results with the strains of *Salmonella gallinarum* and *Salmonella pullorum* which were available. This medium contained Bacto-peptone, agar, dextrin, sulfanilamide, and brom-thymol-blue made up in distilled water, tubed, adjusted to pH 7.3 and sterilized for 25 minutes at 12 pounds pressure before slanting. The pullorum organism showed very little growth and no color change after 48 hours, whereas the fowl typhoid organism gave a good growth and showed the production of acid. Other media are being devised containing different indicators and growth factors which will facilitate a clear-cut distinction between all strains of *Salmonella gallinarum* and *Salmonella pullorum*.—B. F. Cox, Eva S. Krug, and Helen E. Levy.

Substations

Northeast Louisiana Experiment Station, St. Joseph

C. B. Haddon, *Superintendent*
John A. Hendrix, *Asst. Agronomist*
Russel Y. Ratcliff, *Research Associate*

Flame Cultivation

The following practices were used to control undesirable vegetation in 22½ acres of cotton. The approximate costs will be shown only for flame cultivation and chopping.

Rotary hoes and rotary shields were each used twice before the cotton was thinned by hoe.

Hoe hands were used for thinning the crop and getting big weeds and vines out of the cotton late in season. In weeding each hand took two rows at a time and merely walked through the field chopping the big weeds and vines as he came to them. The total cost for hoeing was $7.44 per acre. It is believed that this cost of hoeing can be considerably reduced, if not entirely eliminated, in our next flame cultivation work.

A two-row tractor cultivator was used once without the flame cultivator. The two-row cultivator was used for six operations. The cotton was also cultivated at the same time. Due to this only the cost of fuel for flaming will be given. Cost for fuel, butane or propane, at 14 cents per gallon was 44 cents per acre per flaming.

Had the flame cultivator not been used, hoe hands would have been used four times to clean out undesirable vegetation. This would mean that the cost of hoeing one acre one time would be $5.60 with hands working for $2.80 per day. The total cost for hoeing per acre would therefore be $22.40.

Total cost for hoeing four times per acre	$ 22.40
Less cost of actual hoeing	7.44
	$ 14.96
Total cost of fuel used for 6 cultivations	2.64
Total savings per acre	$ 12.32

The operation cost of tractor could be charged up to cultivation since this practice has to be performed regardless of whether the flame cultivator is used or not.

Since there is such a shortage of farm labor, the saving in operational cost is just one of the desirable features of the flame cultivator. In this part of the state it is practically impossible to hire enough hoe hands at any price to clean out a crop in one-third the time that it

can be done with flame cultivators. This fact is making the use of the flame cultivator practically imperative regardless of the saving in cost of operation.

Cotton Varietal Trials—1947

The cotton variety test was planted April 28. One hundred pounds of nitrate of soda were applied at the preparation of seedbed, and 100 pounds as a side-dressing after chopping. The test was poisoned 4 times for insect control. Results are shown in the following table. A difference of 65 pounds of lint per acre between any two varieties is required for significance; a difference of 86 pounds is highly significant.

Variety	Seed cotton per acre	Lint per acre	Per cent lint	Staple length	Bolls per pound
Hi-Bred	2010	884	44.0	7/8	63
Delfos 9169	2106	821	39.0	1 1/8	72
Deltapine 15	1957	816	41.7	1 1/16	71
White Gold (Wilt)	2033	809	39.8	1 1/16	62
Deltapine 14-060	1918	800	41.7	1 3/32	70
Delfos 651 (42-51)	2175	798	36.7	1 1/8	78
Stoneville 2B	2069	774	37.4	1 1/16	65
Stoneville 5A	2004	762	38.0	1 1/16	71
Bobshaw 1	2001	758	37.7	1 3/32	68
Coker 100 W. R.	2028	758	37.4	1 3/32	63
Empire W. R.	1976	751	38.0	1 3/32	60
Stoneville 62	1847	702	38.0	1 1/16	68
Rowden 41B	1866	677	36.3	1 1/32	57
Coker 100 staple	1986	661	33.3	1 5/32	74
Delfos 4313	1760	660	37.5	1 3/32	77
Delfos 444B	1904	642	33.7	1 3/16	71
Acala 4-42	1525	630	41.3	1 1/16	62
Watson Mebane	1498	581	38.8	1 inch	42
Acala 1517 W	1519	568	37.4	1 3/32	62
Delfos 920	1545	535	34.6	1 5/32	87
Wilds 17	1402	465	33.2	1 1/4	62

Cotton Dusting

In 1947 several new cotton insecticides were tested in comparison with undusted check plots and plots treated with calcium arsenate containing 2 per cent nicotine. The results show that some of the new chemicals gave very satisfactory control of all cotton insects while some gave satisfactory control of the boll weevil but did not control the aphid and red spider. The yield of seed cotton per acre from the check was 2,044 pounds; the yield from the calcium arsenate plus nicotine treatment was 2,455 pounds, an increase of 410 pounds over the check. The best yield obtained from any of the new chemicals was from a mixture of 5 per cent DDT and 3 per cent benzene hexa-

chloride. This mixture gave a yield of 2,595 pounds cotton per acre, or 515 pounds over the check. It was observed that there was a slight build-up of red spider near the end of the dusting season from the use of this mixture, but this was controlled by adding 40 per cent sulphur in the last application. The use of 5 per cent gamma benzene hexachloride alone was not quite as good as the mixture with DDT, a yield of 2,178 pounds of cotton being obtained where this material was used alone. Plots treated with 20 per cent chlorinated camphene gave a yield of 2,323 pounds seed cotton per acre, 279 pounds over check. There was some build-up of aphid and red spider following the use of this material. The use of 5 per cent chlordane gave a yield of 2,206 pounds per acre, 162 pounds above check. There was some build-up of aphid following the use of this material. Parathion, a new material (O,o-diethyl-o-p-nitrophenyl thiophosphate, also known as 3422), was used in this test and gave an excellent control of cotton aphid. The yield from this treatment was 2,315 pounds per acre, 271 pounds over check. This material shows excellent promise as an aphicide and a mitecide, but more experimental work needs to be carried on with it to determine its mixing quality with other materials and its effect on humans and animals before its general use can be recommended.

Cotton Spacing

With the advent of mechanized cotton production, especially in regard to cotton spacing, experiments conducted at this Station over a period of 6 years may be of interest. This work was divided in two groups: (1) hills 12 inches apart with from 1 to 5 stalks per hill; (2) hills spaced 8 to 24 inches apart with one stalk per hill. Rows in both tests were 40 inches wide.

The results from these tests indicate that neither number of stalks per hill nor spacing of hills makes much difference in the final yield of cotton. In the first test (stalks per hill) the 6-year average yield from 1 stalk per hill was 1,834 pounds seed cotton per acre and the yield from 5 stalks per hill was 1,768 pounds. The yields from the 2-, 3-, and 4-stalks-per-hill were about the same as from the 1 and 5 stalks.

In the second group (various distances between hills) the results were not very different. The average yield from the 8-inch spacing, 1,956 pounds, was slightly higher than from the 24-inch spacing, 1,818 pounds.

From the above results it may be concluded that neither the number of stalks per hill nor the spacing between hills is of prime importance in cotton growing, especially if uniform stands are maintained.

The Time of Applying Nitrogen Fertilizers

The time of applying nitrogen to cotton on alluvial lands has some influence on the increase in yield obtained. Tests over a period

of 15 years, using four sources of nitrogen, were conducted in which nitrogen at the rate of 30 pounds per acre was applied at the time of seedbed preparation, usually about two weeks before planting, and as a side-dressing when cotton was approximately 4 to 5 inches high. The results show that with every source used the applications made before planting gave the best results. The 15-year average increase over check from pre-planting application for all sources was 528 pounds seed cotton per acre, while from the side-dressing application the increase over check was 417 pounds, a gain of 111 pounds in favor of the pre-planting method. This finding may be important to farmers going into mechanical operations, as equipment is available with which farmers may put out fertilizer at time of seedbed preparation and in the same operation.

Hybrid Corn Test No. 1

In 1947 45 strains of hybrid and 2 varieties of open-pollinated corn were planted in Hybrid Test No. 1. Since the practice of using large quantities of nitrogen and closer spacing in corn production is coming into general use in the Delta parishes, these practices were adopted in carrying out this test. Owing to seasonal conditions, date of planting, May 6, was later than generally advised in this section. Nitrogen at rate of 32 pounds per acre was applied in deep furrow and bedded on about two weeks before planting. When the corn was 6 to 8 inches high, additional nitrogen at rate of 64 pounds per acre was applied as a side-dressing. Corn was spaced 18 inches apart, two stalks per hill, or about 17,500 stalks per acre. Season was unusually dry, only one good rain being received during the growing period of the corn. In spite of the dry season, however, excellent yields were obtained. The highest yield, 122.3 bushels per acre, was made by Hybrid Dixie 17. Of the 45 hybrid strains 30 yielded over 100 bushels per acre. The average yield of the two open-pollinated varieties was 93.8 bushels per acre. The highest yield from any Louisiana hybrid of which seed are available was No. 468, a white strain which yielded 108.8 bushels per acre. The highest yield obtained from any Louisiana hybrid, 511, was 113.9 bushels per acre. The results from this test indicate that by the use of abundant nitrogen, high producing hybrid seed, and good cultural practices, excellent yields of corn can be produced in the Louisiana Delta even in seasons usually considered adverse.

Hybrid Corn Test No. 2

In this test 16 hybrid strains from commercial breeders and one open-pollinated variety as a check were planted May 5. The test was carried out on very fertile soil and fertilized with 40 pounds of nitrogen per acre applied as a side-dressing when the corn was 6 to 8 inches high. The corn was spaced one foot apart in the drill, one stalk per hill,

or approximately 13,000 stalks per acre. Stands were practically perfect. The best yield, 78.5 bushels per acre, was obtained from Funk's G737. The second best yield, 76.2 bushels per acre, was obtained from Missouri Hybrid 5171, and the third best yield, 74.2 bushels per acre, from Wood's V125. The yield obtained from the open-pollinated variety was 57.5 bushels per acre. One object in conducting this test was to find a high producing corn which would mature earlier than any of the strains or varieties generally used in this section. This is desirable for farmers who practice hogging down corn and soybeans. It was observed in this test that two of the hybrid strains matured approximately two weeks earlier than any of the corns usually grown in this section commercially.

Rate of Nitrogen for Corn

In 1947 a test was begun to determine the maximum of profitable use of nitrogen for corn. The following table shows the method of applying the fertilizer and the results obtained. As will be seen from the yield of the check plot, the soil selected was unusually fertile. Corn was planted May 6, stands were very uniform, and the stalks per acre were approximately 10,000 in all treatments. It is indicated from this test that on good land and with proper fertilization good corn yields may be obtained even in extremely dry seasons.

Rate Applied per acre	Yield per acre	Increase over check
Check	58.6	----
16 lbs. side-dressing	70.2	11.6
16 lbs. before planting, 16 lbs. side-dressing	73.4	14.8
16 lbs. before planting, 32 lbs. side-dressing	79.5	20.9
32 lbs. before planting, 32 lbs. side-dressing	82.1	23.5
32 lbs. before planting, 48 lbs. side-dressing	86.1	27.5
32 lbs. before planting, 64 lbs. side-dressing	87.6	29.0
50 lbs. before planting, 64 lbs. side-dressing, 24 lbs. phosphorus before planting, 24 lbs. potash before planting	95.0	36.4

Soybean Variety Tests

Soybean variety tests have been conducted using all available varieties and many new strains from commercial breeders and other Experiment Stations. Soybean production has grown in importance in the last few years in the alluvial area to such an extent that it has become one of the most important money crops. Owing to this condition the Station has endeavored to test a large number of varieties which would cover a wide range of harvest time. These tests have included varieties widely grown in the corn belt which mature for harvest in August before cotton opens, thus avoiding conflict of harvest of these two crops. Two varieties obtained from Indiana, Patoka and Gibson, have given good yields for the past 4 years and may be recommended to growers of this section. The following varieties, which

mature somewhat later than the two above, are well adapted to Northeast Louisiana: Ogden, Roanoke, Ralsoy, Dortchsoy No. 2, Burdette 12, Woods Early Yellow, and Volstate. This group matures for harvest in September or early October. Among the late varieties, maturing in late October, which have given good yields are Mamotan 6680, Nela, Pelican, Acadian, and Nanda.

Hogging off Corn and Soybeans

Preliminary tests (one year) indicate that the addition of tankage to the ration of corn and soybeans may be very profitable. In this test good quality feeder pigs were used and were turned on the corn and beans July 22. The field was divided in two equal size plots and one lot of pigs was given tankage daily. The yield of corn on the field where the pigs received tankage was 98 bushels per acre as compared with a yield of 88 bushels per acre on the other plot. The production of pork per acre where the corn and beans were supplemented with tankage was 1,380 pounds as compared to a production of 957 pounds per acre from the lot not receiving tankage. It required 398 pounds of corn to produce 100 pounds of pork when tankage was added, and 515 pounds of corn without tankage. A return of $3.66 per bushel of corn was obtained where tankage was added, and $2.83 per bushel without tankage. The use of tankage gave a net increase of $55.57 per acre above cost. These figures are based on a price of 25 cents per pound for the finished pigs. Since this work has been carried only one year, it should not be taken as conclusive.

Oat Variety Tests

These tests have been conducted with standard varieties and new strains from commercial breeders and other Experiment Stations. The tests are usually planted in early October, rate of seeding 2½ bushels per acre, plots 8 feet wide by 400 feet long. Plots of this length are used in order that harvesting may be done with combine. This method is used so that the results obtained will be more in line with those obtained by farmers.

Average results for the past 5 years show that best yields are obtained from the Red Rustproof type, which includes Nortex, Appler, Delta Station 88, Ferguson 922, Alber, and others of this group. A relatively new disease, Helminthosporium blight, caused rather severe damage to Victoria hybrids, especially in 1947, making these strains and varieties fall below the 5-year average of the varieties named above. Farmers are advised to use varieties resistant to this disease. Experiments are being conducted to determine the effect of seed treatment on the Helminthosporium blight, but no recommendations can be made in regard to this at present. So far as is now known, all strains of the Red Rustproof type are resistant to the Helminthosporium blight.

North Louisiana Experiment Station, Calhoun

Dawson M. Johns, *Superintendent*[1]
Ralph S. Woodward, *Superintendent*

The annual Field Day program was held in July for the first time since about the beginning of the war period. The number of visitors ranged between 1,500 and 2,000. The tour of the station was so arranged that every person had an opportunity to observe and hear a brief discussion on each project. In addition to the explanations given during the tour, visitors were supplied with a mimeographed report summarizing the projects observed. Projects in the following fields of work were observed: agronomy, horticulture, and animal industry, including beef cattle, dairying, poultry, and swine. Reports given herewith were prepared by the respective project leaders whose names are also given.

Agronomy

Corn Fertilizers—Corn fertilization highlighted the agronomic program of work. Yields were not as high as had been obtained in previous years owing to adverse weather conditions. However, profitable yield responses were obtained from the use of as much as 60 pounds of nitrogen per acre, both with and without the addition of phosphate and potash The highest and most profitable yield of corn was obtained from the use of 375 pounds of an 8-8-8 fertilizer per acre before planting and a side-dressing of 30 pounds of nitrogen per acre about 30 days after planting. The increase in yield was 35.3 bushels per acre over the unfertilized area. A similar amount of plant food could be obtained from the use of 300 pounds of a 5-10-10 fertilizer per acre before planting and side-dressing with 45 pounds of nitrogen.

Corn Spacing—The corn spacing work was conducted on rows 40 inches wide. The evidence obtained thus far with currently recommended production practices indicates that individual plants should be spaced about 24 inches apart in the drill. In a highly fertilized spacing experiment the yields produced for a three-year period averaged 66.9 bushels per acre for the 18-inch spacing, 64.6 bushels for the 24-inch spacing, and 60.9 bushels for the 30-inch spacing. The quality of the corn from the 24-inch spacing was superior to that obtained from the 18-inch spacing.

Corn Hybrids and Varieties—More than 40 hybrids and varieties were tested. Yield data and information as to ear size, height, soundness, etc., were recorded. The hybrids stood the abuse of dry, hot weather during the formation period much better than the open-

[1] Transferred to North Louisiana Hill Farm Station, Homer, as superintendent.

pollinated varieties. In the test comparing the hybrids and open-pollinated varieties, the five highest yielding hybrids produced 63 per cent more corn than the five open-pollinated varieties. The difference in favor of the hybrids was more than in previous years when growing conditions were more suitable. The recommended hybrids for northern Louisiana are Louisiana 468, Dixie 11, and Funk's G 714.

Cotton Varieties—Variety and new strains tests were conducted as in previous years. Yields were lower than usual, but the results obtained substantiate a continued recommendation of planting the Stoneville 2B, Miller, and Deltapine varieties in the hill area. Other varieties, such as Delfos, Empire, Hi-Bred, Coker, and Bobshaw, were tested but did not make a desirable showing. The staple of the Stoneville 2B and Deltapine was one inch, while the Miller had a staple length of only seven-eights inch.

Stoneville 2B and Deltapine are good producing varieties in the area and, generally, it is expedient for the farmer to select these varieties because of the available seed supply. However, Miller is a sturdy type variety which produces large, easy-to-pick bolls, and is believed to be the best variety for average conditions prevailing in the area. Some of the new strains from the breeding plots are making a good showing and will be tested further.

Cotton Fertilizers—An experiment was begun to determine the comparative value of nitrogen in nitrate of soda and ammonium nitrate and, also, to determine the value of sodium in nitrate of soda. Conclusions cannot be drawn from the data obtained. However, irrespective of the source of nitrogen, the highest yields were from the plots receiving 600 pounds of a 6-8-8 fertilizer per acre. It will be necessary to continue the experiment for a period of years to ascertain the objectives set forth.

Soybeans—A soybean variety test was conducted for the first time in several years for the purpose of determining whether any of the recently developed varieties and strains would produce satisfactory seed yields in the hill area. Varieties included in previous tests had not produced satisfactory seed yields. Almost all of the varieties included in the previous tests required a long growing season to reach maturity. However, the current test included four groups; i.e. early, medium early, medium late, and late maturing varieties. The striking point of interest in the test was the close relationship of the yields obtained and the date of maturity of the respective varieties, the early group averaging 15.0 bushels per acre, the medium early group 10.4 bushels, the medium late group 7.7 bushels, and the late group 5.5 bushels.

Some of the newly developed, early maturing varieties appear promising as seed producers for the hill area. However, more data

should be obtained before specific varieties or strains are recommended. Gibson, C 101 (Dunfield x Manchu), C 463 (Dunfield x Mansoy), C. 464 (Dunfield x Mansoy), C 470 (P. I. 54592), and C 508 (Patoka x L7-1355) led in production with yields exceeding 15 bushels per acre.—Dawson M. Johns.

Horticulture

Sweet Potato Fertilizer Test—Sweet potato fertilizer tests were continued in two different localities of North Louisiana, and the results show, as in previous years, that the most profitable yields were obtained from heavy applications of a high-grade fertilizer. The following amounts of plant food elements per acre are recommended: 30-40 pounds of nitrogen, 60-80 pounds of P^2O^5 and 60-80 pounds of potash. These elements may be supplied by using 600-800 pounds of a 5-10-10 fertilizer.

Watermelon Breeding—Individual plant selections were made from the seedlings carried over from the 1946 season and from commercial varieties which were grown on wilt-infested soils. Numerous crosses were made between leading commercial varieties and varieties showing resistance to wilt. Crosses were also made using some of our most desirable seedlings as parents.

The strains planted on wilt-infested soil as increase plots, showed very promising results, particularly two strains. These strains were the Holmes type, which showed no indication of wilt and was of good quality with the exception of exhibiting a tendency for hollow heart. The Dixie Queen type showed 99 per cent of the plants to be resistant to wilt and was of excellent quality. Several selections were made from each of these strains and the seed massed for further testing on wilt-infested soil.

Peach Variety Test—The production results of the peach variety test on ten-year-old trees of eight varieties showed Golden Jubilee, a yellow freestone, leading with 2.7 bushels per tree, followed by Georgia Belle with 2.3 bushels per tree. In the 1946 report Georgia Belle led in production, but during the 1947 season, neither Georgia Belle nor Hiley Belle, both white freestones, sized out very well. The Elberta averaged 1.6 bushels per tree.

The 25 varieties which were planted during the 1945 season produced a small crop this season. Several varieties of various ripening dates proved very promising toward a continuous supply of high quality peaches throughout the entire season. Dixigem, our earliest high quality yellow freestone peach, led in production with an average of 35.3 pounds per tree, followed closely by Red Haven with an average of 33.8 pounds per tree.

Field or Cow Peas—A variety test was conducted to determine the productiveness of some of the more desirable strains and selections as compared to that of the leading edible varieties which are being grown in this area. The L-35, a speckle crowder type pea, continued its superior yielding ability. It ranked first in a group of 13 varieties with a green pea production of 2,610 pounds per acre, followed by Brown Crowder with 2,310 pounds per acre. A large field planting of the L-35 was made on wilt-infested soil, and its high degree of resistance continued to prevail. Selections were made from strains carried over from last season, for the purpose of purification and increase for seed production.

Tomato Variety Test—Plants of the leading commercial tomato varieties and promising strains were transplanted to the field March 31. Six hundred pounds of 4-8-8 fertilizer per acre were applied in the bed two weeks prior to transplanting. The plants were side-dressed with 200 pounds of sodium nitrate per acre two weeks after transplanting. The Strain 6-1-1, a red tomato, gave the highest yields, followed by Marglobe and Rutgers, respectively.—J. C. Taylor.

Devon Cattle Project

Crimson clover provided excellent pasture for the Devon herd from February to early May. Following this period only a limited amount of grazing was available owing to dry weather. Because of the unfavorable weather conditions for pasture production, it was necessary to feed the herd a small amount of hay and grain to supplement the pasture during the late fall and winter. Although feeding and grazing were limited, the herd remained in thrifty condition and all of the cows of calving age freshened. Experiences and observations indicate that the Devon breed may be better suited to the conditions prevailing on many hill land farms than the present stock of

Devon cattle at the North Louisiana Experiment Station at Calhoun.

cattle being grown on these farms. The farms referred to are those that are not provided with adequate land and other resources to sustain commercial dairying or beef cattle enterprises.

The number of visitors and inquiries received during the year concerning the Devon project continued to increase. The demand for breeding stock of the Devon breed has exceeded our supply, and the interest in general would seem to justify an increase in the herd to about 20 females.—Dawson M. Johns and J. L. Heath, Jr.

Sudan Superior to Kudzu as Dairy Pasture

Sudan and kudzu pastures as stimulators to the milk production of Jersey cows were compared during 1947 in a test at the North Louisiana Experiment Station at Calhoun. The experiment, which lasted over a 35-day period, involved 11 cows and was started on July 21.

Results of the experiment showed Sudan to be superior to kudzu. It not only increased milk production more than did kudzu, but it also produced new growth faster, thus permitting more grazing periods. The results as shown in table form follow:

	Daily milk per Cow (lbs.)	Change from preliminary period (%)
Group I (6 cows)		
Preliminary period, permanent pasture, 5 days	21.1	------
Test period, Sudan, first 5 days	25.0	+18.5
Test period, Sudan, second 5 days	28.0	+32.7
Transition period, permanent pasture, first 5 days	22.0	+ 4.3
Transition period, permanent pasture, second 5 days	19.6	− 7.1
Test period, Sudan, first 5 days	22.0	+ 4.3
Test period, Sudan, second 5 days	23.2	+10.0
Group II (5 cows)		
Preliminary period, permanent pasture, 5 days	19.0	------
Test period, kudzu, first 5 days	20.8	+ 9.5
Test period, kudzu, second 5 days	21.6	+13.7
Transition period, permanent pasture, first 5 days	21.7	+14.2
Transition period, permanent pasture, second 5 days	20.5	+ 7.9
Test period, Sudan, first 5 days	23.2	+22.1
Test period, Sudan, second 5 days	21.9	+15.3

Regardless of method of comparison, the above shows Sudan superior to kudzu. During the experiment, group I was placed on Sudan at the same time that group II was on kudzu, and the second 5-day-period increase due to Sudan was 32.7 per cent as compared to 13.7 on kudzu. Also, it can be seen that group II when later placed on Sudan (because the kudzu had not restored itself) increased an average of 22.1 per cent for the first 5-day period—an amount greatly in excess of that shown while on kudzu.

It is of interest that when group II was changed from kudzu to permanent pasture in the transition period, they actually increased their milk production. During this same period group I when changed

from Sudan to permanent pasture showed a big drop in milk production. Both groups of cows grazed the same permanent pasture during the preliminary and the transition periods and were together during the final test period on Sudan pasture.—D. M. Seath and D. M. Johns.

Hogging Off Crops on Hill Land

Seventeen spring pigs grazing on one acre of ripe oats from May 28 to July 28 gained 1,050 pounds. They received in addition to the oats 1,670 pounds of mixed grain feed and protein supplement. Oats are particularly valuable for carrying sows and pigs over a period in early summer when feed is generally scarce and high-priced, and may last until early corn is ready to hog off.

The pigs were put on corn August 18 to October 27. They averaged 108.6 pounds at the beginning of the test and weighed 225 pounds when finished, an average of 1.66 pounds of grain per day. While on the corn they received ½ pound soybean oil meal per head per day. The yield of corn per acre was 43.6 bushels for one field and 58.6 bushels for the second. The average pork per acre was 494 pounds.

—C. I. Bray, Dawson Johns, and J. L. Heath.

Turkeys on Range and In Confinement

This is the third year that Broad Breasted Bronze turkeys have been grown at the North Louisiana Station. Because fencing materials could not be obtained to construct suitable separate pastures, the original plan to test different pasture crops this season had to be abandoned. Instead, a comparison was made of range versus confinement growing conditions. The brooding period ended at eight weeks. Most of the turkeys were moved to the ranges at this time. Fifty were grown to market age in confinement. In addition to the Broad Breasted Bronze turkeys grown at Calhoun, 118 Beltsville Small Whites were grown in confinement at the Baton Rouge Station.

The poults were all started on all-mash turkey starter and continued on it for the first eight weeks. Cracked corn was fed in small quantities before eight weeks of age. At that age the turkeys grown at Calhoun were all placed on a relatively simple mash consisting of 25 per cent yellow corn meal, 25 per cent (dehydrated) sweet potato meal, 15 per cent each of ground oats, meat scrap, and cottonseed meal and 5 per cent dried milk. All turkeys in addition had corn and oats and oyster shell and grit free choice.

Mortality—The remarkable livability to 20 weeks of age of 94.2 per cent of the poults placed in the brooders was obtained. Sad to relate, however, dogs raided the range and killed 30 turkeys just after they were 20 weeks of age. Including those killed by dogs, a livability

of 74.9 per cent to 32 weeks of age was obtained; and aside from those killed, a loss of only 12.4 per cent was experienced. The percentage marketed of the 206 started was still higher than the average for the United States. Livability on the Beltsville Small Whites was 87.5 per cent. Turkeys can and should be grown in much greater numbers in Louisiana.

Feed Consumption and Average Weights—The Broad Breasted Bronze poults consumed 7.7 pounds of feed to 8 weeks of age, while the Beltsville Small Whites consumed 6.6 pounds. The 25 males grown in confinement consumed an average of 106 pounds of feed from day old to 28 weeks of age, or 132 pounds of feed to 32 weeks of age. The confined hens consumed much less, 76 pounds to 28 weeks, or 94 pounds to 32 weeks. The average for the males and females grown in confinement was 93.5 pounds to 28 weeks, or 113 pounds to 32 weeks. When these figures are compared to the feed consumed by the range grown turkeys (both sexes)— 76 pounds to 28 weeks or 94 pounds to 32 weeks—the feed saving value of the pasture was 19 pounds per turkey to 32 weeks of age. Since the cost of feed consumed was $5.60 per 100 pounds, the value of the pasture was $1.06 per turkey. The weights of the range and the confinement tom turkeys were 23.4 and 22.7 pounds, respectively. The weights were two to three pounds lighter than for previous years. The females on range averaged 14.5 pounds and those grown in confinement, 13.7. The hens also were lighter (.8 pounds to 2.3 pounds) than in 1945 and 1946. It is impossible to know definitely the cause of the slower growth, since different stock and different rations were used as well as less favorable weather experienced.

As an indirect comparison it is of interest to note the average weights of the Beltsville Small Whites at 24 weeks of age when they were marketed. The males averaged 16.5 pounds at 24 weeks, about 2 pounds less than Broad Breasted Bronze of the same age, and the hen turkeys averaged 10 pounds, slightly more than 2 pounds below the Broad Breasted Bronze hens. The average feed consumption of the males and females (not separated) was 55.7 pounds to 24 weeks of age. Four and four-tenths pounds of feed was required per pound of gain to 24 weeks of age.

Dressing and Grading—No great differences in dressing or drawing percentages were apparent when comparing confinement versus range grown turkeys, male versus female turkeys, or Broad Breasted Bronze turkeys versus Beltsville Small White. The Beltsville Small Whites did give dressed percentages slightly lower, one to two per cent, and drawn percentages one-half to one per cent less than the older Broad Breasted Bronze turkeys. The dressed weight (blood and feather loss) averaged about 91.5 per cent of the live weight for the different

groups. The full-drawn weights averaged about 80 per cent of the live weight.

Margin Over Costs—Feed costs as actually expended to 32 weeks of age were recorded and the sales of the turkeys credited. Calculated on the basis of total feed purchased (includes feed eaten by turkeys killed and those that died), the margin of income over feed cost averaged $2.41. The feed cost was $7.46 per turkey marketed and the average sales price $9.87. With the cost of the poults prorated against the turkeys marketed, the margin over feed and poult cost averaged $1.44 per turkey.—C. W. Upp and J. L. Heath, Jr.

Ultrasimple Cottonseed Meal Laying Mashes Less Efficient

During the war years quite simple laying mashes with single vegetable proteins were used with fairly satisfactory results when supplemented with good green feed. This simplification was carried to an extreme when laying mashes composed of approximately one-third soybean meal and two-thirds corn meal were used in one pen, and one-third cottonseed meal and two-thirds corn meal in two other pens. One of the latter and the soybean meal pen were supplemented with rye grass as winter green feed; the other cottonseed meal pen had no winter green feed. A fourth pen (as control) was given a more complex and complete laying mash. All pens were fed scratch grain, oats, oyster shell, and grit in addition to the laying mash. The complex mash pen averaged 171 eggs per hen for 10 months, the soybean meal pen 145 eggs and the cottonseed meal with rye grass 127 eggs, while the cottonseed meal-no winter green feed pen averaged 120 eggs. The cottonseed meal pen with winter green feed laid 6 eggs more per hen during the fall and winter, when eggs are highest in price, and consumed less feed than the other cottonseed meal pen. Considering these two facts, the winter pasture was worth 35 to 45 cents per hen. The eggs were somewhat smaller in the two cottonseed meal pens than in the other two pens.

Eggs were set during March, after native grasses were cut, and the per cent hatch of all eggs set varied from 79 to 83 per cent. Thus it is seen that ultrasimple rations may give above average hatching results when good green feed is available.

—C. W. Upp and J. L. Heath, Jr.

Rice Experiment Station, Crowley

Rufus K. Walker, *Superintendent*

Fertility Studies

Straw and Fertilizer Applications to Land Planted to Rice Every Year and in Alternate Years on Crowley Silt Loam

The year 1947 was the tenth year that this experiment has been conducted to determine the effects on the yield of rice from turning under 3 tons of rice straw per acre with and without 400 pounds of 6-8-8 fertilizer per acre. In 1947, where rice has been planted in alternate years, the application of rice straw alone gave an increase of 5.0 bushels per acre over the check, while the application of straw and fertilizer produced an increase of 29.5 bushels per acre over the check. The ten-year average increase in yield over the check was 5.8 bushels per acre due to the application of straw and 16.8 bushels per acre due to the application of straw and fertilizer. In the plots that have been planted to rice every year the application of rice straw did not give any increase in yield over the check, but the application of straw and fertilizer produced an increase of 15.7 bushels per acre. The results of these experiments show the benefit that may be derived from applying rice straw to the soil. It is estimated that an average of 1½ tons of straw per acre is replaced by harvesting with a combine. The results also show that there is a general trend toward lower yields when the land is planted to rice every year, even when straw and fertilizer are added.

Two-Year Rotation of Rice With Fertilized and Non-Fertilized Lespedeza

In an experiment begun in 1942 to determine the effect on the yield of rice from a two-year rotation with fertilized and non-fertilized lespedeza, lespedeza was seeded and fertilized with 200 pounds of 4-12-4 per acre for three years. No lespedeza was seeded during 1945 and 1946. The volunteer stands during these years were very poor and irregular and the conclusion was made that lespedeza could not be depended on for a volunteer stand after a crop of rice. In 1947 rice following fertilized lespedeza produced 15.6 bushels per acre more than rice following non-fertilized lespedeza. The six-year average increase in yield of rice following fertilized lespedeza over the yield of rice following non-fertilized lespedeza was 8.0 bushels per acre, which is a 30 per cent increase. The mowed lespedeza that had received fertilizer was equivalent to two good cuttings of hay, while the non-fertilized lespedeza did not make sufficient growth for a cutting of hay.

Pasture-Rice Rotation Experiments

Pasture-rice rotation experiments were conducted during 1947 on three different soil types. The data for 1947 continue to show the value of improved pastures for high production of beef per acre and the resulting increase in rice yield following improved pastures. Beef production on improved pastures consisting of mixed Dallis grass, bermuda grass, white clover, and common lespedeza was 160 to 327 pounds per acre as compared to 26 to 58 pounds of beef per acre produced on the check pastures. Increases over the check pastures varied from 134 to 278 pounds of beef per acre. The second consecutive crop of rice following three years' of pastures at Lozen Leger's, Rayne, La., produced yields that were very close to the yields obtained the first year. Approximately 20 barrels per acre were harvested from the improved pasture plots and 15 barrels per acre from the check pasture plots.

Rice Varieties[1]

The object of the rice improvement program of the Rice Experiment Station is to develop and make available to growers better early, midseason, and late-maturing varieties of medium- and long-grain rice.

The following nursery and related work was carried on in 1947:

1. The making of a considerable number of crosses for improvement and quality studies.

2. The growing of approximately: 85 F_1 plants for improvement purposes and genetic studies; 90 F_2 populations for selection and 15 for genetic study; 120 bulk populations of F_3 and more advanced generations; 2,000 progeny rows in advanced generations for selection; 230 panicle-to-row increase plots for reselection and increase of pure seed; 700 rows of miscellaneous odd types for genetic work, selections for disease, and insect studies, for making crosses, or to maintain seed stocks; 13 nursery yield tests with 192 entries; 4 field-plot variety tests with 44 replicated entries; 4 outfield variety tests; 14 increase fields; 6 new selections grown on a field basis by farmers.

3. Cooperation with the Experiment Station pathologist on seed treatment and Cercospora studies and with the Bureau of Entomology and Plant Quarantine in studies on varietal resistance to stalk borers.

The acreage of Magnolia increased tenfold over that of 1946, and it attained an established place as a standard variety. This new early medium-grain variety, released in 1945, was selected from a cross of Improved Blue Rose x Fortuna made in 1929. Of the eight principal

[1] Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

varieties grown in Louisiana in 1947, four were releases from the Rice Experiment Station and together occupied about 45 per cent of the acreage.

Several new pure strains merit extensive testing and consideration for possible release on the basis of 1947 and previous results. These new varieties, which originated as selections from crosses, include medium-grain types of early, midseason, and medium-late maturity, and long-grain types of midseason, medium-late, and late maturity.

The medium-grain group includes (1) a high-yielding, stiff-strawed, smooth-hulled strain that matures a few days later than the present early varieties; (2) one similar to Blue Rose in many respects but disease resistant and smooth-hulled, and (3) a stiff-strawed, smooth-hulled, medium-late strain with grain somewhat smaller than Blue Rose that should be especially suitable for combining and drying.

In the long-grain group are two selections of promise that have a thicker but clearer grain that should mill out more head rice than any of the long-grain varieties now being grown. In the long slender classification are selections otherwise comparable to Bluebonnet, Texas Patna, and Rexoro, but superior in quality, strength of straw, or disease resistance.

No new varieties were named for final release in 1947 or 1948. Varieties recommended for general production in 1948 remain the same as in 1947, namely: Magnolia and Zenith for early medium-grain; Improved Blue Rose and Blue Rose 41 for midseason medium; Bluebonnet, Fortuna, and Nira for midseason long-grain; and Texas Patna and Rexoro for late long-grain varieties. Farmers who contemplate the sowing of varieties not on the recommended list are urged to consult the Rice Experiment Station or their county agent.

—N. E. Jodon and D. A. de la Houssaye.

Oat Varieties[1]

The uniform fall-sown oat nursery and a field-plot test of 12 varieties and selections were sown December 10. Good stands and yields were obtained. For grazing purposes oats should have been seeded about six weeks earlier. Camellia made the highest yield, but it and the other later varieties lodged because of rust. Fulgrain matured early enough to escape the rust, did not lodge, and yielded well. C. I. 4322 had a decumbent type of growth that is of interest from the standpoint of adaptation to grazing.—N. E. Jodon.

[1] Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture.

Fruit and Truck Experiment Station, Hammond

W. F. Wilson, Jr., *Superintendent*

Spacing Tests With Strawberries

During the past six years the major portion of the strawberry acreage of the commercial area has been shifted from the variety Klondike to the Klonmore, a variety which is resistant to the leaf diseases and requires no spray program. Large plants of this variety have resulted in a widespread practice by the growers of using a wider spacing of plants on both single and double-row plantings than was used with the older Klondike variety. Tests this season involving the use of 12-, 15-, and 18-inch spacing in the drill on both single and double rows gave the following yields.

	Yields in Crates Per Acre Spaced in Inches		
Rows	12	15	18
Single	209	184	157
Double	284	256	237

Yields this season increased as the number of plants per acre increased, with the double rows and closer spacing being more effective. The yields per individual plant in these areas were just the reverse, as the wider spacings gave consistent increases in fruit harvested. Single rows spaced 18 inches in the drill averaged 145.6 grams per plant in comparison with 88.8 grams per plant from double rows spaced 12 inches in the drill.

Strawberry Varieties

The strawberry seedling L-39 was named "Marion Bell" this season by Dr. Julian C. Miller, who is in charge of the strawberry breeding program conducted by Louisiana State University. This new variety was widely distributed during the year (a few plants to each grower) from this Station and all other available sources. The yields and behavior of this variety have been recorded for three years by this Station and should be valuable to the many buyers, shippers, processors, and growers observing this new variety in commercial plantings this coming season. Over a period of several years the average yields of the varieties Klonmore and Klondike show very small differences. Because of the large percentage of the total commercial acreage planted to Klonmore, records of this variety during the years 1945, 1946, and 1947 will be used for comparison with the behavior of the latest introduction, Marion Bell.

In each of the three years this new variety has produced a larger

yield, with an average of 218 crates per acre during the shipping season in comparison with 180 crates per acre from the Klonmore. The yields for these two varieties through the entire season (including cold-pack season) were: Marion Bell—276 crates; Klonmore—230 crates per acre. During this three-year period the Marion Bell has produced an average of 49 per cent of its crop for shipping during the first half of the season, while the Klonmore produced an average of 43.8 per cent of its crop for shipping during the corresponding period.

In addition to these indicated advantages this variety produces a most attractive fruit for the market owing to coloring of the entire berry and the high degree of lustre or gloss.

Southeast Louisiana Experiment Station, Franklinton

SAM H. SMITH, *Superintendent*

A superintendent's home, foreman's home, four laborers' cottages, dairy barn, and a loafing and hay storage shed have been completed. It is expected that buildings will be accepted by the station within the next 30 days. As soon after that as possible a dairy herd will be purchased and experimental dairy work started. Pasture experiments were established in the fall of 1946 to be used in connection with the dairy herd.

In addition to the 175 acres cleared and developed in connection with the dairy, 125 acres to be devoted to horticultural work and feed crops have been cleared and developed.

A nursery has been developed in which all grasses and legumes suitable for grazing in this area are being planted in small plots under standard treatment, each being replicated three times. Standard treatment consists of lime, at the rae of 2½ tons per acre, and 3-12-12 fertilizer at the rate of 600 pounds per acre, with additional treatments of nitrogen on grasses.

The following have been planted in the nursery: Ladino clover, white Dutch clover, hard seed crimson clover, New Zealand white Dutch clover, alsike clover, selected Louisiana white Dutch clover, red clover, subterranean clover, Hubam clover, Kentucky 31 fescue grass, and Alta fescue grass. This list of plants will be brought up to date in the nursery and kept abreast of newly developed forage plants which may show possibilities in this area. The season of growth, quantity of vegetation, palatability, seeding characteristics, and adaptability to our soil and climate will be studied in the small plots, and plants with possibilities will be propagated on a larger scale for further study.

U. S. Department of Agriculture

Bureau of Entomology and Plant Quarantine

New Insecticides Continue Promising Against Cabbage Caterpillars and Turnip Aphids[1]

In field-plot tests against cabbage caterpillars during 1947, DDT continued to show excellent results. A dust containing 3 per cent of DDT, applied at intervals of 10 to 14 days, appeared to be the most satisfactory treatment for ordinary infestations until plants began to head. After the heads had formed a dust mixture containing 0.5 per cent of rotenone and 0.15 per cent of pyrethrum afforded protection until harvest.

In the spring experiments dusts containing 10 and 5 per cent of a chlorinated camphene (67 to 69 per cent chlorine) gave high caterpillar mortality and excellent protection to cabbage and were greatly superior to dusts containing 1 per cent of rotenone, technical benzene hexachloride (3 per cent of gamma isomer), and 0.75 per cent of rotenone plus 2 per cent of nicotine. In the fall experiments dusts containing 3 per cent of DDT or 10 per cent of chlorinated camphene and a benzene hexachloride dust containing 3 per cent of gamma isomer were greatly superior to cryolite, a mixture of 19 parts of calcium arsenate and 1 part of Paris green, and the untreated check, against the cabbage caterpillars other than the webworm. Against the cabbage webworm (*Hellula undalis* (F.)), which destroyed the buds in approximately 29 per cent of the untreated plants, all the treatments were significantly better than the untreated check, but cryolite and the calcium arsenate-Paris green mixture were inferior to the DDT, chlorinated camphene, and benzene hexachloride treatments. On the fall crop satisfactory protection was afforded until harvest by applications of DDT, benzene hexachloride, and chlorinated camphene made before the plants began to head, but subsequent applications of rotenone and pyrethrum were necessary on the spring crop.

Against the turnip aphid (*Rhopalosiphum pseudobrassicae* (Davis)) on the spring and fall crops technical benzene hexachloride dusts containing 1 and 3 per cent of the gamma isomer were slightly better than dusts containing 1 per cent of rotenone, 7.5 and 15 per cent of chlorinated camphene, or 3 per cent of nicotine. A spray containing 1 part of hexaethyl tetraphosphate to 1,600 parts of water was ineffective, but one containing 1 part of tetraethyl pyrophosphate to 2,000 parts

[1] In cooperation with the Louisiana Agricultural Experiment Station.

of water was as effective as 1 per cent rotenone spray and better than treatments containing 7.5 per cent of chlorinated camphene or 0.5 per cent of rotenone plus 1 per cent of oil. In the experiment during the fall benzene hexachloride and parathion were very toxic to turnip aphids.

Except for DDT on cabbage before the heads begin to form, none of these new materials can be recommended for control of cabbage caterpillars until further tested. Like DDT, most of these materials leave poisonous residues on the plants and should not be used, even under experimental conditions, on turnips and mustard or on cabbage after they begin heading. The search is, therefore, being continued in an effort to find an effective means of controlling cabbage caterpillars and the turnip aphid that will not constitute a health hazard.

—K. L. Cockerham and O. T. Deen.

Insecticide Tests Against the Sweet Potato Weevil During 1947[2]

In field-plot tests during 1947 for the control of the sweet potato weevil (*Cylas formicarius elegantulus* (Sum.)), 10 pounds of calcium arsenate per acre applied at 14-day intervals and 20 pounds per acre at 28-day intervals and 20 pounds of benzene hexachloride dust (5 per cent gamma) per acre at 14-day intervals were the best treatments used, with little difference between these treatments. Nine applications of calcium arsenate made at 14-day intervals gave the greatest reduction of field-run weevil-infested potatoes, the reduction being 87 per cent, or 24 bushels per acre, below that of the untreated check. Twenty pounds of 5 per cent DDT dust per acre applied at 14-day intervals and a DDT-xylene emulsion applied at 28-day intervals at the rate of 1 pound of technical DDT per acre for the first two applications and 2 pounds per acre for each of the last three applications were not effective. Promising results were obtained with 20 pounds of a 10 per cent chlorinated camphene dust applied at 14-day intervals and with a cultural treatment of high hilling of the plants at the last cultivation.

DDT dusts and emulsions continued to show excellent results as a residual treatment for storage houses, for killing adult weevils around refuse dumps, and for protecting seed potatoes against infestation. Ten per cent DDT mixed with the soil at the rate of 10 pounds of technical DDT per acre did not prevent the development and emergence of sweet-potato weevils from seed potatoes bedded in the treated soil, or subsequent infestation of the plants. There was no reduction in the number of plants produced in the soil treated with DDT.

In cage tests in the field DDT dust and DDT emulsion did not show

2 In cooperation with the Louisiana Agricultural Experiment Station and the Louisiana Department of Agriculture and Immigration.

the same residual, or lasting, effect as when applied in storage houses, where the material was protected from weathering. Mortality of sweet potato weevil adults dropped off sharply after 2 weeks where 1 pound of technical DDT per acre in xylene emulsion was applied as a concentrated spray to plants and the tops of the rows, and after 3 weeks where 3 pounds of technical DDT spray was applied in the same form. Three pounds of DDT in conventional xylene emulsion showed approximately the same mortality as 1 pound in concentrated spray. Five per cent DDT dust applied at the rate of 1 pound of technical DDT per acre gave very low mortality, but on the third day after treatment the plants were exposed to the September hurricane, during which the wind reached a velocity of 90 or more miles per hour and the precipitation totaled 2.5 inches. The dust was probably washed and blown off the plants.

One application of the sodium salt of 2,4-D at the rate of 1¼ pounds to 100 gallons of water gave very promising results for destroying sweet potato plants and roots on seedbeds and "mother rows" in late spring and on wild host plants of the sweet potato weevil during the summer, when the plants were given a thorough coverage. Further work is needed, however, on the best formulation of this herbicide to use, and on the possible injury it may cause to adjacent or nearby crops and plants, before recommendations can be considered for its general use.

Several new synthetic and organic materials were tested in the laboratory in baits and on plants against sweet potato weevil adults. Some of these show promise but need further testing.

—K. L. Cockerham, P. K. Harrison, and O. T. Deen.

Bee Culture Investigations

(Report of the Southern States Bee Culture Laboratory)

Wax Moth Damage in Louisiana

Larvae of the wax moth (*Galleria mellonella* (L.)), "wax worms" to most beekeepers, continue to cause heavy damage to combs in Louisiana. Much of this loss occurs in stored combs, but combs on weak colonies or nuclei are also injured. Beekeepers rely on the bees to protect combs. So long as the colony or nucleus is strong, little damage occurs. In Louisiana the wax moth is active most of the year, and eggs or young larvae are present in every hive as well as in wax refuse around the bee yard or in storage buildings. In addition to keeping colonies strong, it should be a routine practice to clean out all possible sources of infestation.

Combs in storage can be protected by fumigating with calcium

cyanide, methyl bromide, carbon bisulfide, carbon tetrachloride, or paradichlorobenzene. All these fumigants are dangerous gases and should be handled out of doors, away from fires and according to approved practices.[1] With the possible exception of methyl bromide, none of these fumigants will kill wax moth eggs. Paradichlorobenzene is safer than the others and easier to handle. Under ordinary conditions of use it is non-poisonous to humans. In use four or five supers are stacked above a tight bottom, the joints between supers are sealed with gummed paper, and two handfuls of paradichlorobenzene are scattered over the top bars of the top super; the cover is then put in place. Inspections should be made at 2-week intervals and more crystals put in if none are present. Exposure of combs in the open air for 1 to 2 hours removes all odor of the crystals. Honey, especially the lighter colored and milder flavored grades, will absorb the odor to an objectionable extent after long exposure.

In the bee yard the best protection against wax moth damage is strong colonies of bees, the prompt uniting of weak colonies, and the removal of surplus combs to storage.—Warren Whitcomb, Jr.

Size of Honey Crop Affected by Queen Bee Supersedure

Queen supersedure (natural replacement of a queen bee by the colony) and loss of queens through unknown means reduced the honey yield of a colony. In the last 6 years approximately 50 per cent of the young queens introduced into the colonies in the fall have disappeared during the following year. The following table gives the average surplus honey yield (in pounds) of colonies that kept their queens and those that did not:

Year	*Original queens*	*Superseded or replaced queens*
1942	184	144
1943	280	250
1944	177	98
1945	114	90
1946	130	110
1947	227	176

The mean difference of 40 pounds between the original and the replacement queens is significantly large.—Everett Oertel.

Bee Breeding

During the 1947 season 198 queens were reared, artificially inseminated, and shipped for test to cooperating laboratories at Laramie,

[1] Warren Whitcomb, Jr., 1942. The Wax Moth and Its Control. U. S. Dept. Agri. Circular 386, Rev., 11 pp.

Wyoming, and Madison, Wisconsin. Five inbred lines and various hybrids were represented.

Some of the lines which have been selected for resistance to American foulbrood for a number of years are now practically 100 per cent resistant. Only 1 of 42 colonies developed any disease in the 1947 tests, and this colony recovered before the end of the season. Although the inbred lines are non-productive, some of the hybrids involving them are sufficiently resistant and productive to be made available to bee breeders interested in producing them commercially. Better control of mating through artificial insemination has been largely responsible for this progress.—Otto Mackensen.

Bureau of Plant Industry, Soils and Agricultural Engineering

Irish Potato Breeding

The object of the cooperative Irish potato investigation project of the United States Department of Agriculture, the experiment station of Louisiana, and those of other Southeastern States, is to develop varieties of potatoes suitable to the South and resistant to diseases prevalent in this region. Since the seed potatoes used in the South are grown in the northern states, promising seedlings well adapted to the South are also tested in northern seed producing areas for adaptability.

Plots to test seedling varieties for resistance to scab, late blight, early blight, and leafroll are maintained at Baton Rouge. During the last 10 years considerable progress has been made in learning more about the heritable characteristics of different potato varieties and seedlings used in making crosses. In the plots used to test potatoes for resistance to disease primarily, only those seedlings derived from crosses that had at least one parent resistant to the disease tested, are used. This results in the development of a fairly high percentage of resistant seedlings.

This year was the first time that we tested seedlings for resistance to late blight. Several of these were highly resistant to this disease, and failed to develop any noticeable infection, whereas adjoining susceptible seedlings and varieties were often killed by the late blight.

Late blight has been found in Louisiana regularly during the last four years, and is now the most important disease confronting the potato industry in this state. It has discouraged the growing of potatoes, and as a result the acreage planted in this crop is reduced each year. By utilizing resistant varieties and seedlings developed by the United States Department of Agriculture in cooperation with State Experiment Stations in conjunction with investigations conducted here, it should

be possible to find and develop a suitable variety resistant to late blight.

So far we have not succeeded in developing a seedling immune to early blight, but we have a large number of seedlings that show a high degree of resistance to this disease and develop only a few small lesions on the foliage, whereas under similar conditions susceptible varieties are practically defoliated.

We now have 12 seedling varieties that are practically immune to scab, and when planted in soil heavily infested with the scab organism, develop only a few small shallow lesions. In addition to these we have several seedlings that are somewhat more susceptible but could profitably be grown in scabby soil, where susceptible varieties would be completely covered with scab lesions, rendering them unfit for commercial purposes.

Work was initiated this spring to also test seedlings for resistance to leafroll and net necrosis.—THEODORE P. DYKSTRA.

Corn Breeding

The Louisiana corn improvement investigations are conducted cooperatively by the Agronomy Department, Louisiana Agricultural Experiment Station, and the Division of Cereal Crops and Diseases, U. S. Department of Agriculture. They are closely coordinated with the regional corn improvement investigations in the South through the Southern Corn Improvement Conference. Close cooperation is maintained with the Agricultural Experiment Stations in other Southern States.

Hybrid corn, a development of inbreeding and crossbreeding, produces 20 per cent more grain to the acre than the old-fashioned, open-pollinated varieties. In 1947, one acre out of every 15, or 7 per cent, of the Louisiana corn acreage was planted with hybrid seed developed at the Experiment Station. This is an increase of about 3 per cent above the acreage planted in the previous year. In 1947 the area planted to Louisiana hybrid corn increased the production of the State by over one million bushels. As the benefits of hybrid corn become better known, its use is expected to increase rapidly during the next few years. Hybrid corn has stimulated more interest in corn production, and, as a result, it has been found that corn yields can be further increased by thorough preparation of seedbed, closer spacing of plants, heavier applications of fertilizer, and shallow cultivation.

Of the thousands of inbred lines developed during the past several years, only a few are worthwhile. Most of them are discarded because of deleterious characters. The good lines must possess many desirable characteristics, such as strong roots and stalk, normal green leaves, large tassel, good ears, adequate husk length and tightness, and moderate resistance to insects and diseases. Their high yielding capacities

in hybrid combinations must be determined by carefully conducted experiments.

The outstanding inbred lines used as parents of the hybrids recommended for planting by Louisiana farmers are L 2-2, L 10, L 44, L 62, Tx 61M, L 87-2, L 90, L 91, L 504, L 507, L 510, L 515, L 548, L 568, L 569, L 578, L 586, L 589, and F5-375. The hybrids now in commercial production are La. 468, La. 521, La. 731, La. 1031, La. 2509, La. 2909, and Dixie 11. The last of these, Dixie 11, was developed as a product of the regional corn improvement investigations in the South.

Studies now in progress, involving new breeding material and the improvement of old lines by crossing and backcrossing, should result in better lines and hybrids than those now being grown.

—Hugo Stoneberg.

Cotton Disease Investigations

Seed Treatment

In a further effort to improve stands through the reduction of seedling diseases, the regional study on chemical seed treatment and processing conducted by the Division of Cotton and Other Fiber Crops and Diseases, U. S. Department of Agriculture, in cooperation with the various states of the main cotton belt was continued during the past year. The tests in Louisiana were conducted at the Main Station near Baton Rouge and on the farm of Guy P. Stubbs located approximately 10 miles east of Monroe. These tests comprised three differently processed lots of seed as heretofore, namely, fuzzy (regular ginned), reginned, and acid-delinted, together with seven chemical treatments (six dusts and the slurry method, the latter involving application of the chemical disinfectant to the seed in the form of a water suspension). Treatments included Dow 9-B, Dow 9-B matted, Dow 9-B and Spergon, Dow 9-B and Zerlate, Mycotox, and Ceresan M dry and slurry. The acid-delinted seed was subjected to dust treatments only. Rate of treatment was standard for all treatments—approximately 1.5 ounces per 30 pounds of seed—with the exception of Dow 9-B and Spergon and Dow 9-B and Zerlate, which received first the standard rate of Dow 9-B and also a subsequent treatment of Spergon and Zerlate respectively at a rate of 4 ounces per 30 pounds of seed.

The seed stock employed in the tests was Coker 100 W. R.-6A grown in South Carolina in 1946 and was heavily infested with the anthracnose fungus.

The effects of the various treatments on seedling emergence and survival were determined 22 days after planting and the data later evaluated statistically at both Baton Rouge and Monroe. The differences in emergence and seedling survival in seed lots were not signifi-

cant. Most treatments, however, at both locations gave highly significant differences over the respective untreated lot. The best treament at Baton Rouge was Ceresan M dry, with 67 and 64 per cent emergence and surviving seedlings, respectively. The next three highest and following in order were Dow 9-B and Zerlate, 63 and 58 per cent; Dow 9-B and Spergon, 61 and 57 per cent; and Mycotox, 58 and 55 per cent. At Monroe the best treatment again was Ceresan M dry, 62 and 59 per cent, followed by Ceresan M slurry, 58 and 56 per cent; Dow 9-B and Spergon, 58 and 54 per cent; and Dow 9-B matted, 57 and 52 per cent.

Highest yields were obtained from reginned and acid-delinted seed in the test at Monroe, the four highest being (in pounds lint per acre) as follows: reginned untreated—774.7; reginned Ceresan M dry—764.8; acid-delinted Ceresan M dry—769.7; acid-delinted Dow 9-B—745.1. Treatment of seed, however, was not reflected in increased yield in all cases.

Fusarium Wilt

These investigations were continued along the lines previously reported and consist of crossing, backcrossing and selection of strains for wilt resistance, fiber strength, good staple length and good gin turnout. Progeny selections were continued with selfed lines of Stoneville 2B, Deltapine 6, Delfos 6102, H. Mebane, Deltapine 6 x Delfos 6102, Deltapine 6 x Delfos 6102 x Deltapine 6, Cook, Coker 100, and Deltapine 15, and lint samples collected for fiber analyses. Another phase of this work is the selection of plants showing high resistance in the field at the close of the season and their removal to the greenhouse for further study and increase during the winter months.

The program begun at this Station in 1939 on roguing and selection for wilt resistance in cooperation with the agronomists has yielded the desired objective. By this method, two lines from the hybrid Deltapine 829 x Dixie Triumph 62-75 (previously reported) have been isolated which are highly wilt-resistant and at present rank among the more productive cottons in variety tests conducted recently at Baton Rouge and at some of the branch stations.

Cotton Root Rot Present in Louisiana

Cotton root rot caused by the fungus *Phymatotrichum omnivorum* and widely prevalent and destructive in Texas and other states of the Southwest was found for the first time in the state by Dr. M. B. Sturgis, head of Agronomy Department, in Bossier Parish on August 12 and also by the writer in Caddo Parish on August 26. Evidence indicates that the disease has been on these properties for several years and has been overlooked thus far. They are the only known root-rot infestations in the state.—D. C. Neal.

Financial Statement---Agricultural Research Funds

July 1, 1946, to July 1, 1947

Federal Research Funds

	Hatch	Adams	Purnell	Bankhead-Jones
Appropriations	$15,000.00	$15,000.00	$60,000.00	$61,211.40

Expenditures—Federal Funds

Salaries and Wages	$13,953.00	$13,395.00	$49,830.53	$51,384.01
Supplies and Expense	727.00	1,080.00	7,013.97	6,464.29
Travel	320.00	525.00	2,555.50	3,078.10
Capital Outlay	----------	----------	600.00	285.00
Total	$15,000.00	$15,000.00	$60,000.00	$61,211.40

Expenditures—State Funds

	Bankhead-Jones Offset	State Non-Offset	Other* State Funds	Research Fellowships
Salaries and Wages	$62,117.04	$118,947.52	$176,616.68	$13,973.19
Supplies and Expense	8,785.49	21,039.23	59,449.09	8 859.90
Travel	3,080.50	4,935.00	13,742.00	2,640.00
Capital Outlay	----------	----------	10,731.94	4,750.00
Total	$73,983.03	$144,921.75	$260,539.71	$30,223.09

*Includes appropriations for substations and special Legislative appropriations.

Agricultural Experiment Station Staff

ADMINISTRATION

W. G. Taggart, M.S., Director
I. L. Forbes, Ph.D., Assistant Director
Lawrence V. George, B.S., Editor
Nathalie Poirrier, Executive Secretary
Leonie Noel, Secretary to the Director
Frances S. Stoker, Librarian

STATE STATION, BATON ROUGE

Agricultural Chemistry and Biochemistry

[1]E. A. Fieger, Ph.D., Nutritionist; Head of Agricultural and Biochemistry Department
[2]Martha Hollinger, M.S., Associate Nutritionist
[1]J. G. Lee, III, Ph. D., Assistant Chemist
Socrates Kaloyereas, Ph.D., Assistant Food Preservationist
[2]Harvye Lewis, M.S., Research Associate in Nutrition
[1]Virginia Rice Williams, M.S., Assistant Nutritionist

Agricultural Economics

[1]B. M. Gile, Ph.D., Agricultural Economist; Head of Agricultural Economics Department
[1]J. N. Efferson, Ph.D., Agricultural Economist
[1]Frank D. Barlow, Jr., M.S., Associate Agricultural Economist
Martin D. Woodin, Ph. D., Associate Agricultural Economist
[1]J. M. Baker, M.S., Assistant Agricultural Economist
[1]J. P. Montgomery, M.S., Assistant Agricultural Economist
James F. Hudson, B.S., Assistant Agricultural Economist
William H. Alexander, B. S., Research Associate in Agricultural Economics
[3]Kenneth E. Ford, M.S., Research Associate in Agricultural Economics
Felix E. Stanley, M.S., Research Associate in Agricultural Economics
[4]Roy B. Johnson, M.S., Research Associate in Agricultural Economics
[4]Jerry M. Law, M. S., Research Associate in Agricultural Economics
[4]Marshall E. Miller, M. S., Research Associate in Agricultural Economics

Agricultural Engineering

Harold T. Barr, M. S., Agricultural Engineer; Head of Agricultural Engineering Department
Wiley D. Poole, M. S., Associate Agricultural Engineer
[4]Lawrence E. Creasy, B. S., Assistant Agricultural Engineer
Ned J. Bond, Jr., B. S., Research Associate in Agricultural Engineering
R. B. Lillard, Research Assistant in Agricultural Engineering

Animal Industry

Chas. I. Bray, Ph. D., Animal Husbandman; Head of Animal Industry Research Department
[1]J. B. Francioni, M.S., Animal Husbandman; Professor and Head of Animal Industry Department
[1]R. M. Crown, M. S., Associate Animal Husbandman

[1]S. E. McCraine, M. S., Assistant Animal Husbandman
C. B. Singletary, M. S., Research Associate in Animal Industry
W. E. Monroe, B. S., Pasture Specialist
Herbert Hathorn, Swine Herdsman

Crops and Soils

[1]M. B. Sturgis, Ph.D., Agronomist; Head of Agronomy Department
[5]H. B. Brown, Ph.D., Agronomist
C. T. Dowell, Ph.D., Agronomist
[1]Calvin Clyde Murray, Ph. D., Agronomist
[6]Jared Y. Oakes, M.S., Agronomist
John P. Gray, Ph. D., Associate Agronomist
Walter J. Peevy, Ph.D., Associate Agronomist
[1]William H. Willis, Ph.D., Associate Agronomist
Ferd Self, M. S., Associate Agronomist
[1]C. R. Owen, M. S., Assistant Agronomist
Charles W. McMichael, M. S., Assistant Agronomist
J. B. Holley, M. S., Assistant Agronomist
[4]David S. Byrnside, M.S., Assistant Agronomist
Robert H. Brupbacher, Jr., B.S., Research Associate in Agronomy
H. D. Ellzey, Jr., B.S., Research Associate in Agronomy
Willie K. O'Quin, B.S., Research Associate in Agronomy
S. P. Landry, Farm Foreman
Silton Curtis, Assistant Farm Foreman

Dairy Research

[1]D. M. Seath, Ph.D., Dairy Husbandman; Head of Dairy Research Department
Louis L. Rusoff, Ph.D., Associate Dairy Nutritionist
[4]Cecil Branton, M.S., Assistant Animal Husbandman
[4]Thomas E. Patrick, B.S., Assistant Dairy Husbandman
George D. Miller, B. S., Assistant in Dairy Research

Entomology

C. Egan Smith, M.S., Entomologist; Head of Entomology Research Department
Alvin L. Dugas, M.S., Associate Entomologist
Leo D. Newman, Ph.D., Assistant Entomologist
E. H. Floyd, M.S., Assistant Entomologist

Fertilizer and Feedstuffs Laboratory

E. A. Epps, M.S., Chief Chemist
W. P. Denson, B. A., Assistant Chemist
Jesse L. Farr, M.S., Assistant Chemist
C. C. Moreland, B.S., Assistant Chemist
Frances L. Bonner, M.S., Research Associate in Chemistry
[4]Ethel T. Loyd, B.S., Research Associate in Chemistry

Forestry

[1]Ralph W. Hayes, M.F., Forester; Head of Forestry Department
[1]Bryant A. Bateman, M.S.F., Associate Forester
A. Bigler Crow, M.F., Assistant Forester
Richard F. West, M.F., Assistant Forester
[1]Martin B. Applequist, M.S., Assistant Forester
[1]Charles O. Minor, M.F., Assistant Forester

Home Economics

Floy Eugenia Whitehead, M.S., Associate Home Economist
[4]Mrs. Dorothy S. Moschette, M.A., Associate Home Economist
[4]Cecelia Dolores Pudelkewicz, M.S., Assistant Home Economist
[4]Mrs. Laureame McBryde, B.S., Research Associate in Home Economics

Horticulture

Julian C. Miller, Ph.D., Horticulturist; Head of Horticulture Research Department
W. D. Kimbrough, Ph.D., Horticulturist
[4]Joseph Bailey Edmond, Ph.D. Associate Horticulturist
DeForest Charles Alderman, Ph. D., Assistant Horticulturist
J. J. Mikell, M.S., Assistant Horticulturist
Joseph Montelaro, M.S., Assistant Seed Specialist
[4]Percy Lynwood Hawthorne, B. S., Assistant Horticulturist
Douglas Harper, Farm Foreman

Plant Pathology

[1]Claude W. Edgerton, Ph.D., Plant Pathologist; Head of Plant Pathology Department
I. L. Forbes, Ph.D., Plant Pathologist; Assistant Director of Experiment Stations
A. G. Plakidas, Ph.D., Plant Pathologist
[1]St. J. P. Chilton, Ph.D., Associate Plant Pathologist
E. C. Tims, Ph.D., Associate Plant Pathologist
[3]T. C. Ryker, Ph.D., Associate Plant Pathologist
[4]Weston J. Martin, Ph.D., Associate Plant Pathologist
[4]J. G. Atkins, Jr., Ph.D., Assistant Plant Pathologist
P. J. Mills, M.S., Research Associate in Plant Pathology

Poultry Research

[1]C. W. Upp, Ph.D., Poultry Husbandman; Head of Poultry Department
B. A. Tower, M.S., Assistant Poultry Husbandman
A. B. Watts, M. S., Research Associate in Poultry Husbandry
[4]William A. Johnson, B.S., Research Associate in Poultry Husbandry
J. R. Austin, Farm Foreman

Rural Sociology

[3]T. Lynn Smith, Ph.D., Rural Sociologist; Head of Rural Sociology Department
[1]Homer L. Hitt, Ph.D., Rural Sociologist; Head of Rural Sociology Department
Louise Kemp, M.S., Assistant in Rural Sociology

Sugar Station

E. C. Simon, M.S., Associate Agronomist
C. B. Gouaux, B. S., Associate Agronomist
F. W. Berthelot, Jr., Farm Foreman

Veterinary Science

[1]W. T. Oglesby, D.V.M., M.S., Veterinarian; Head of Veterinary Science Department
[1]Paul L. Piercy, D.V.M., Associate Veterinarian
R. L. Mayhew, Ph.D., Associate Parasitologist
Richard Harvey Davis, D.V.M., Assistant Veterinarian
Eva S. Krug, M.S., Research Assistant in Veterinary Science
Anita Durand Stone, M.S., Research Assistant in Veterinary Science
Helen Elizabeth Levy, B.S., Research Assistant in Veterinary Science

SUB-STATIONS

Fruit and Truck Station, Hammond

W. F. Wilson, Jr., M.S., Associate Horticulturist; Superintendent

North Louisiana Station, Calhoun

[6]Dawson M. Johns, M.S., Associate Agronomist; Superintendent
[4]Ralph S. Woodward, M.S., Assistant Horticulturist; Superintendent
[4]John C. Taylor, M.S., Research Associate in Horticulture
J. L. Heath, Jr., B. S., Assistant in Animal Industry
Leon G. Baker, Farm Foreman

North Louisiana Hill Farm Station, Homer

[7]Dawson M. Johns, M.S., Associate Agronomist; Superintendent

Northeast Louisiana Station, St. Joseph

C. B. Haddon, B.S., Agronomist; Superintendent
John A. Hendrix, M.S., Assistant Agronomist
[4]Russell Y. Ratcliff, B.S., Research Associate in Agronomy
Prentiss Clower, Farm Foreman

Red River Valley Experiment Station, Curtis

[7]Jared Y. Oakes, M.S., Agronomist; Superintendent

Rice Station, Crowley

Rufus K. Walker, M.S., Agronomist; Superintendent
N. E. Jodon, M.S., Associate Agronomist, U.S.D.A.
W. A. Douglas, M. S., Assistant Entomologist, U.S.D.A.
[5]D. A. de la Houssaye, M.S., Assistant Agronomist
David E. Black, B.S., Research Associate in Agronomy

Southeast Louisiana Station, Franklinton

Sam Harrell Smith, M.S., Associate Agronomist; Superintendent
Lester Mulina, Farm Foreman

West Louisiana Station, DeRidder

[4]C. B. Roark, M.S., Associate Agronomist; Superintendent

UNITED STATES DEPARTMENT OF AGRICULTURE

D. C. Neal, Ph.D., Senior Pathologist
T. P. Dykstra, Ph. D., Senior Pathologist
Warren Whitcomb, Jr., Ph.D., Apiculturist, in Charge
T. T. Ayers, Ph.D., Associate Pathologist
John Cotton, M.S., Associate Agronomist
Everett Oertel, Ph. D., Associate Apiculturist
Hugo Stoneberg, M.S., Associate Agronomist
K. L. Cockerham, M.S., Entomologist
Oliver T. Deen, B. S., Assistant Entomologist
P. K. Harrison, M.S., Assistant Entomologist
Otto Mackensen, Ph.D., Assistant Apiculturist
Irwin L. Saveson, B.S., Drainage Engineer

---

[1]Part-time teaching.
[2]On leave of absence.
[3]Resigned.
[4]Appointed on or after July 1, 1947.
[5]Retired.
[6]Transferred.
[7]Transferred to present assignment in Nov., 1947.

Index

Index Continued